Metals Review
THE NEWS DIGEST MAGAZINE

Volume XXIV - No. 9 September, 1951

YOU ARE CORDIALLY INVITED . . .

. . . To visit our display in Space 406, Building F,
at the NATIONAL METAL EXPOSITION in Detroit, October 15-19, 1951

to inspect

1. HOLDEN prefabricated ceramic pot assemblies for standard electrode furnaces . . .
2. Two types of HOLDEN submerged electrode furnaces . . .
3. HOLDEN PERMA-BLACK process—bring samples of malleable iron, cast iron, or stainless to be blackened.

It will be a pleasure to arrange for you to visit various heat treating plants doing modern high speed salt bath heat treating, as well as plants doing austempering or martempering.

We hope you will arrange to visit us—our Detroit telephone number is TExas 4-8127.

THE A. F. HOLDEN COMPANY

P. O. Box 1898
New Haven 8, Conn.

11300 Schaefer Highway
Detroit 27, Michigan

. . . this IS your business

NATIONAL METAL EXPOSITION

NATIONAL METAL CONGRESS

WORLD METALLURGICAL CONGRESS

Wherever and whenever 45,000 metal industry people expose themselves to the newest and the finest in their field . . . when they meet at one Big show to see what's new in fabricating, processing or producing . . . to attend the informative technical sessions of the four great national metal engineering societies . . . that's BIG business.

If your products are beamed at this field . . . if what you make has anything to do with what other folks make of metal . . . this IS your business . . . for the National Metal Exposition this year will start more sales and close more orders than ever before!

Get your share of this Big business . . . make sure of your exhibit space now. Write, wire or phone . . .

NATIONAL METAL EXPOSITION
c/o American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio
Telephone—UTah 1-0200

OCT. 15-19 • DETROIT, MICHIGAN

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIV, No. 9 SEPTEMBER, 1951

CONTENTS

MARJORIE R. HYSLOP, Editor
RAY T. BAYLESS, Publishing Director
GEORGE H. LOUGHNER, Production Manager

• • •

A. P. Ford, Advertising Manager
7301 Euclid Ave., Cleveland 3, Ohio
UTah 1-0200

Harry L. Gebauer
John F. Tyrrell
District Managers
55 West 42nd St., New York 18
CHickering 4-2713

Ralph H. Cronwell, Western Manager
482 Burton Ave., Highland Park, Ill.
HIghland Park 2-4263

Don Harway, West Coast Rep.
1709 West 8th St., Los Angeles 14
DUnkirk 2-8576

• • •

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Walter E. Jominy, President; John Chipman, Vice-President; William H. Eisenman, Secretary: Ralph L. Wilson, Treasurer; Thomas G. Digges, Elmer Gammeter, James B. Austin, James T. MacKenzie, Trustees; Arthur E. Focke, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio. under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers in Central Europe, Asia or the Pacific islands other than Hawaii, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

Metal Show Program

See Special Section

Following Page 16

ASM REVIEW OF METAL LITERATURE

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor

A
GENERAL METALLURGICAL

213-A. Scarce Metals. James E. Payne. *Steelways*, v. 7, July 1951, p. 1-5.

The acute shortage of some of the basic alloying metals needed to build our war machine and to maintain today's civilian production. Sources throughout the world and what is being done to alleviate the problem. (A4, EG-a)

214-A. 1951 Brass Mill Production Viewed as Entirely Dependent on Available Copper, Zinc, and Scrap. T. E. Veltfort. *Metals*, v. 22, July 1951, p. 9-18.

Economic forecast. (A4, Cu)

215-A. World Outlook for Zinc Indicates Continuing High Demand With Pressure for Higher Prices. R. L. Wilcox. *Metals*, v. 22, July 1951, p. 7-8, 12, 19.

An economic analysis. (A4, Zn)

216-A. Scrap Iron and Steel. Edwin C. Barringer. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 50-55.

Surveys sources. Emphasizes importance as a raw material in iron and steel production. (A8, Fe, ST)

217-A. Metallurgy in the Nineteenth Century. Harold K. Work. *Journal of Chemical Education*, v. 28, July 1951, p. 364-368.

Reviews history and developments. Gives production figures in various metals fields. (A4)

B
RAW MATERIALS AND ORE PREPARATION

200-B. The Fluosolid Roaster at Campbell Red Lake Mines, Limited. J. B. McKay. *Canadian Mining and Metallurgical Bulletin*, v. 44, July 1951, p. 457-460.

Construction and operation. The roaster prepares for subsequent cyanidation the bulk flotation concentrate obtained from 400 tons per day of gold ore. (B15)

201-B. Principles of Crushing. Fred C. Bond and Frank E. Briber, Jr. *Pit and Quarry*, v. 44, 1951, p. 173-176, 178.

The theory of crushing, energy input required, particle size distribution, crushability tests, particle shapes, general types of crushing equipment, and the characteristics and limitations of the various types of crushers. (B13)

202-B. Metallurgical Applications of the DorrClone. Frank T. Weems. *Mining Engineering*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 681-690.

The basic operating properties of the above Dutch State Mines cyclone. Certain metallurgical applications exploit these properties. An effective method of controlling the consistency of the DorrClone underflow, and results of performance tests. 13 ref. (B14)

203-B. Comparative Results with Galena and Ferrosilicon at Mascot. D. B. Grove, R. B. Brackin, and J. H. Polhemus. *Mining Engineering*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 691-698.

Conversion to ferrosilicon has reduced heavy-media-separation operating costs, given an improved recovery rate, increased the percentage of the mill feed rejected as a coarse tailing, and provided consistently good results under all feed conditions. Further improvements in metallurgy. (B14, Pb, Fe)

204-B. Hot Metal Cars and Mixers; Selecting Linings for Various Types of Service. Part III. R. P. Heuer, and C. E. Grigsby. *Steel*, v. 129, Aug. 6, 1951, p. 90, 92, 94, 97.

Where conditions are not unusually severe, a dense, stiff-mud high duty fireclay brick laid in sillimanite mortar is most economical; new blast furnace and super-duty fireclay brick are next in line; results with sillimanite and silica types vary; and new high-alumina and unburned magnesite-chrome types show promise. (B19, D1)

205-B. Abrasion of Nine Minerals of Sand Size in Ball Mills. Harold L. Alling. *American Journal of Science*, v. 249, Aug. 1951, p. 569-590.

An attempt was made to investigate mechanical abrasion of nine minerals of sand size treated separately, without water. The results show that ball-mill abrasion reduces size, increases circularity and roundness; and that each mineral has its own peculiarities. 20 ref. (B13)

206-B. Iron Ore Mining, Beneficiation and Reserves. E. W. Davis. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 1-15.

Some of the large iron-ore mines and the techniques used in mining. Types of ore found in various localities and the need for investment of new capital to provide an adequate future iron-ore supply. (B10, Fe)

207-B. Hardinge Heavy Media Separator. W. R. VanSlyke. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 2-15.

The apparatus and its use in connection with heavy-media separation of iron ore. Results of pilot-plant tests on various types of Lake Superior ore and plant-operating data accumulated by M. A. Hanna Co., at their Harrison Concentrator, Cooley, Minn. (B14, Fe)

208-B. A Study of the Application of the D.S.M. Cyclone Separator Process to the Problem of Concentrating Fine Iron Ores. Stephen E. Erickson and Earl C. Herkenhoff. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 16-20.

The equipment and results of its application to above problem using a continuous pilot-plant operated by Hanna Ore Mining Co. (B14, Fe)

209-B. Abrasion Grinding—Mesaba Range. L. J. Erck, R. C. Ferguson, and A. E. Matson. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 21-53.

Abrasion milling is defined as the effect on fine materials of a standard ball mill operated so as to not definitely produce a grind, but rather

See Center Section, Immediately Following Page 16, for Advance Program of

a liberation of the existing middling particles as well as a scuffing action on the ore particles covered with adhering silica by differential grinding. (B13, Fe)

210-B. Virginia Jig Plant of the Charleson Mining Company. Charles Remer and Michael P. J. Walle. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 54-61.

Details of the plant, its methods of operation, and results obtained. Possibilities of application to other iron ores. (B14, Fe)

211-B. A New Machine for Gravity Concentration. E. C. Bitzer. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 62-64.

The Weinig Concentrator is modified and improved version of the old Wetherbee iron ore concentrator. Typical laboratory data on an iron ore and a Pb-Zn ore. Both laboratory and pilot-scale test results have been sufficiently encouraging to warrant construction of a large unit to operate on minus ¼-in. iron ore during the 1950 shipping season. (B14, Fe, Pb, Zn)

212-B. Flotation of Lake Superior District Iron Ores. Fred. D. Devaney. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 65-71.

Since 1947, although no production Fe-flotation plants have been built, much information has been gained through laboratory pilot-plant tests. Attempts to summarize these developments and to point out some possible applications of the processes. (B14, Fe)

213-B. Agglomeration by the Pelletizing Process. E. W. Davis. "Eleventh Annual Mining Symposium," *University of Minnesota*, 1950, p. 72-75.

Developments in the process, especially major changes in the earlier Grondal process. Data obtained with seven iron ores. (B14, Fe)

214-B. Trends in Blast Furnace Practice. R. P. Towndrow. *Metallurgia*, v. 44, July 1951, p. 17-21.

More and more attention is being devoted to preparation of the ore before charging, in order to improve performance of the furnace. These and other aspects of present-day trends. (B15, B16, D1, Fe)

215-B. The Flotation of King Island Scheelite in Hard Mine Water. R. J. Goldacre. *Australian Journal of Applied Science*, v. 2, Mar. 1951, p. 89-107.

The flotation of scheelite and andradite in hard water was investigated using several collectors. The selective conditions for separation were confined to low pH values. Graphs show relationship between pH and concentration of collector necessary. 28 ref. (B14, W)

216-B. Research on the Efficiency Increase of Moving-Band Sintering Plants. (In German.) Herbert Pohl. *Stahl und Eisen*, v. 71, June 7, 1951, p. 597-605; June 21, 1951, p. 664-669; disc., p. 669-673.

Ore-dressing and other preliminary treatment of material to be sintered; a special experimental sintering plant; also testing of quality, strength, and other physical characteristics of sintered ore; effect of fuel on sintering operation, and control of sintering mixture by changing its composition. 35 ref. (B16, Fe)

217-B. Principles and Operation of the Pan Sintered Process With Especial Reference to Fine Ore Sintering. (In German.) Heinrich Huisken. *Stahl und Eisen*, v. 71, July 5, 1951, p. 701-707.

Conditions for production of high quality pan-sintered iron with good microporosity, high resistance to abrasion, and high degree of oxidation. (B16, Fe)

C
NONFERROUS EXTRACTION AND REFINING

91-C. Continuous Casting and Rolling Process Developed for Making Aluminum Rod. Frank P. Leahey and M. J. Fey. *Wire and Wire Products*, v. 26, July 1951, p. 581-582, 606-607.

Machinery, furnaces, and operations. (C5, F27, Al)

92-C. Secondary Aluminum Recovery in the South Pacific. H. W. Franz. *Journal of Metals*, v. 3, Aug. 1951, p. 597-599.

Aluminum from scrapped aircraft around the island of Biak was recovered by rather crude but effective methods. Techniques of furnace operation and chemical control. (C21, A8, Al)

93-C. Arc Melting of Titanium Metal. S. F. Radtke, R. M. Scriver, and J. A. Snyder. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 620-624.

An automatic, continuous casting arc furnace employing a nonconsumable electrode and a d.c. arc was constructed and operated successfully for Ti. A comparison of the properties of arc and induction-melted Ti indicates that where high ductility, formability, and toughness are required, arc melted metal is preferable. 14 ref. (C21, Ti)

94-C. Production of Aluminum From Kalunite Alumina. Arthur Fleischer and Julian Glasser. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 634-636.

Investigation shows that the reduction of Kalunite alumina has produced commercially acceptable metal on a fairly large scale. (C23, Al)

D
FERROUS REDUCTION AND REFINING

243-D. Significance of Air Temperature in Open Hearth Operation. John S. Marsh. *Industrial Heating*, v. 18, June 1951, p. 1032, 1034, 1036, 1038, 1040, 1042; July 1951, p. 1224, 1226, 1228, 1230, 1232, 1326, 1328.

Previously abstracted from *American Iron and Steel Institute*, Preprint, 1951. See item 175-D. (D2, S16, ST)

244-D. Possibilities of Iron & Steel Making in India Without Coking Coal. (Continued.) H. Schrader and D. Jagat Ram. *Journal of Scientific and Industrial Research*, v. 10A, May 1951, p. 185-198.

A general review of various available methods. Metallurgical principles, working procedures, best-suited ores and fuels, economy and efficiency of various processes, namely the acid operating Renn process, the basic operating pig iron smelting in rotary kilns and the ore-coal-briquette smelting method. 20 ref. (D8, Fe)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

245-D. Open Hearth Charge Ore—Key to Steel Capacity Expansion. Lewis B. Lindemuth. *Journal of Metals*, v. 3, Aug. 1951, p. 592-596.

Use of a higher amount of ore in ingot production. Factors affecting low ingot yield. Process used in the pilot plant. (D2, Fe)

246-D. Oxygen in Acid Electric Steel Production. J. H. Garrison. *Journal of Metals*, v. 3, Aug. 1951, p. 601-602.

Practice by Oklahoma Steel Casting Co. (D5, ST)

247-D. Ore Practice in Acid Electrics. F. J. Stanley. *Journal of Metals*, v. 3, Aug. 1951, p. 603-604.

The iron-ore melting practice in use at McConway & Tooley Corp., Pittsburgh. Data presented were obtained during the production of a series of 17 heats. (D5, Fe)

248-D. Effects of Manganese and Its Oxide on Desulphurization by Blast-Furnace Type Slags. Nicholas J. Grant, Ulf Kalling, and John Chipman. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 666-671.

Studies on the role of MgO in desulfurization as compared to CaO, the role of MnO in desulfurization, the role of mechanical stirring on the approach to equilibrium of S from metal to slag and the limiting reactions which constitute the slow steps in desulfurization. Table shows the composition of slag and metal samples taken at 1525° C. 10 ref. (D1, B21, CI)

249-D. Effect of Silica Reduction on the Desulphurizing Power of Blast-Furnace Type Slags. Nicholas J. Grant, Olaf Troili, and John Chipman. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 672-673.

The rate of removal of S from molten pig iron is affected by Si content of the iron. The results are interpreted as showing that SiO_2 in the slag is a sufficiently good oxidizing agent to interfere with the principal desulfurizing reactions. When sufficient Si is present to prevent further reduction of SiO_2, the transfer of sulfur from metal to slag is extremely rapid. (D1, B21, CI)

250-D. Desulphurizing Action of Titanium in Steels. W. P. Fishel, William P. Roe, and James F. Ellis. *Journal of Metals*, v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 674-676.

Reports the distribution of S between Fe and Ti in Fe-Ti-S alloys and in Fe-Ti-C-S alloys. The compound TiS was found, which exists as a separate phase at temperatures below 1200° C. Ti in steels reacts with S in preference to carbon. (D general, Ti, CN)

251-D. The Big Blowout; How the Bessemer Converter Makes Steel. *Steelways*, v. 7, July 1951, p. 16-17.

Colored diagrams and brief text explain the process in elementary terms. (D3, ST)

252-D. Blast Furnace Controlled Split-Wind Blowing at Algoma Steel Corp. William O. Bishop. *Iron and Steel Engineer*, v. 28, July 1951, p. 78-82; disc., p. 83.

History and development of split-wind blowing. Installation and operation at the Algoma blast-furnace plant. Furnace conditions. (D1)

253-D. Jet Tapping of Open Hearth Furnaces. H. H. Northrup. *Iron and Steel Engineer*, v. 28, July 1951, p. 83-86.

How explosives may be used to tap openhearth furnaces with economy and safety over the oxygen lance method. The method and equipment. (D9, ST)

254-D. Instrumentation and Control for Mixed Fuels and Oxygen in Open Hearth Furnaces. Martin J. Conway and Edward H. Cauger. *Iron and Steel Engineer*, v. 28, July 1951, p. 106-114.

Equipment for fuel oil temperature and viscosity control, furnace pressure control, fuel control and summarization, O_2 and air summarization, atomizing system, and automatic reversal from time or maximum temperature. Control performance and maintenance are evaluated. (D2, S18, ST)

255-D. Pig Iron. B. M. Stubblefield. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 56-79.

History, methods of ore mining, beneficiation of the ore equipment used and production data. (D1, B general, Fe)

256-D. Open-Hearth Steel. L. F. Reinartz. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 80-115.

Development of the process; factors influencing furnace design; production data. (D2, ST)

257-D. Bessemer Steel. H. W. Graham. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 116-131.

Historical sketch of the industry, the equipment used, and the techniques used in steel production. (D3, ST)

258-D. Electric Arc Furnace Steel. Walter M. Farnsworth. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 132-147.

Details on equipment design and practice; production data. (D5, ST)

259-D. Wrought Iron. Charles FonDersmith and Edward B. Story. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 148-155.

Historical outline. The operational sequence of the process. Effects of alloying elements. (D8, Fe)

260-D. Tool Steel. George A. Roberts and Charles F. Sawyer. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 358-365.

Operations in the manufacture of toolsteels include electric-furnace production, ingot production, blooming ingots to billets, annealing, forging, drawing, etc., to produce primary forms. (D5, F general, TS)

261-D. The Use of Lime, Limestone, and Dolomite in Iron and Steel Manufacture. *Edgar Allen News*, v. 30, July 1951, p. 901-903.

Illustrated survey. (D general, ST)

262-D. Modern Blast Furnace Equipment. T. H. Stayman. *Times Review of Industry*, new ser., v. 5, July 1951, p. 20-22; Aug. 1951, p. 25-26.

An illustrated review. (D1)

263-D. Steel Company of Wales Limited. *Foundry Trade Journal*, v. 91, July 26, 1951, p. 93-94.

Plant will produce 30,000 tons of steel ingots per week, from which will be rolled approximately 3500 tons of rails and railway material and 22,800 tons of sheet and plate. (D general, F23, CN)

264-D. Tool Steel; Manipulation and Heat Treatment. Alan J. Blackwell. *Iron and Steel*, v. 24, July 1951, p. 355-358; Aug. 1951, p. 387-388.

Some methods involved in the processing of the more highly alloyed types, or high speed steel. Factors involved in the production of ingots and their heat treatment. Forging is discussed in the second part. (D general, F22, J general, TS)

265-D. Pressure-Flow Relations in the Blast Furnace. (In French.) J. Szczeniowski. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 296-298.

Treated mathematically. (D1)

266-D. Kinetic Study of the Reduction of the Protoxides of Iron by Hydrogen. (In French.) J. Moreau, J. Bardolle, and J. Benard. *Revue de Métallurgie*, v. 48, June 1951, p. 486-494.

Preparation of the oxides and method of studying them, kinetics of reduction, crystalline state of reduced Fe, and micrographic study of reduction. X-ray pictures and micrographs. 13 ref. (D general, Fe)

267-D. Ladle Linings Made of Special Sands or Mixes. (In Italian.) Giuseppe Zillani. *Metallurgia Italiana*, v. 43, June 1951, p. 216-220.

Best kinds of sands for use with rammed lining material for ladles. (D9, ST)

268-D. Reactions of Chromium With Slags in the Basic Open-Hearth Furnace and Recovery of the Chromium. (In German.) Peter Bremer. *Stahl und Eisen*, v. 71, May 24, 1951, p. 575-580; June 7, 1951, p. 605-611; disc. p. 611-612.

Experiments were made to determine the effect of ferrous oxide and other substances on recovery of Cr from basic slag. 20 ref. (D2, A8, ST, Cr)

269-D. Economizing on City Gas by Supplementing the Heating of Open-Hearth Furnaces With Tar Oil. (In German.) Heinrich Clees. *Stahl und Eisen*, v. 71, June 21, 1951, p. 673-678; dis., p. 677-678.

Development and installation of gas and fuel-oil nozzles in which a sudden scarcity of gas can readily be supplemented by fuel oil. Experiments show that this arrangement reduces life of acid-furnace roof, requiring the use of basic and special checker brick. (D2, ST)

270-D. Comparison Between Brick-Lined and Rammed Ladles in Pouring Openhearth Steel. (In German.) Wolfgang Schleicher. *Stahl und Eisen*, v. 71, July 5, 1951, p. 788.

Rammed ladles cause higher consumption of refractories, but they also have better durability. (D9, D2)

271-D. The Possibility of the Direct and Simultaneous Production of Coal Gas and Iron. (In German.) H. Koppenberg and W. Wenzel. *Brennstoff-Wärme-Kraft*, v. 3, July 1951, p. 217-219.

Process involves generation of coal gas and smelting of iron with a change of coal and iron ore in a low-stack blast furnace. Advantages are enumerated; disadvantages are shown to be based on uncertain price of, and demand for, gas. (D8, Fe)

E

FOUNDRY

401-E. Synthetic Resins in the Foundry. *Foundry Trade Journal*, v. 91, July 5, 1951, p. 3-9.

The use and development of synthetic resins for core binders, molding sands, and other foundry applications. Technical and economic aspects and relation to comfort and health. (E18)

402-E. Chemical Chilling and Feeding. J. E. R. Tompkin. *Foundry Trade Journal*, v. 91, July 5, 1951, p. 11-33; disc., p. 13, 16.

Orthodox chilling, tellurium chilling, feeding, and exothermic feeding. (E23)

403-E. Valve Tappet Castings. *Foundry Trade Journal*, v. 91, July 5, 1951, p. 14-16.

Discussion of R. Dulché's paper on the above, which appeared in the June 7 issue. See item 367-E, 1951. (E11, CI)

404-E. The Solidification of Bronze Castings. *Industrial Heating*, v. 18, July 1951, p. 1196.

Results obtained in a long-term study. (A review of a paper by R. W. Ruddle, presented before the British Institute of Metals.) (E25, Cu)

405-E. Microwave Components: Precision Castings vs. Electroforming. A. A. Feldmann. *Materials & Methods*, v. 34, July 1951, p. 70-72.

Waveguides are special precision tubes, which may be straight sections, bends, twisted shapes, tapered sections, transition pieces from round to rectangular cross-sections, and multi-armed junctions. Various kinds of precision casting and electroforming are used, depending on the exact shape, the tolerances, and number of pieces on order. (E13, E15, L18)

406-E. Steel Castings and Welding Can Be Combined Successfully. Philip O'Keefe. *Materials & Methods*, v. 34, July 1951, p. 73-75.

Parts fabricated by welding together several steel castings or a combination of cast and wrought pieces. Design principles, welding specifications, and welding practice. (E general, K general, CI)

407-E. Founding Light Alloys. *Metal Industry*, v. 79, July 6, 1951, p. 13.

Summarizes the results of a study of 16 light alloys, listing the characteristic casting properties and most useful applications of each. (E general, Al)

408-E. Porosity and Blistering in Pressure Casting. (In French.) *Métallurgie et la Construction Mécanique*, v. 83, May 1951, p. 357, 359, 361, 373.

Choice of alloy for pressure-cast pieces. Machining, influence of molding conditions, and control of porosity. Many different kinds of alloys are considered. (E16)

409-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry*, v. 79, July 1951, p. 186, 188; Aug. 1951, p. 184, 186, 188.

Characteristics of foundry coke and the requirements of a fuel for satisfactory use. Aug. issue: recommended procedure for adjusting and burning-in the coke bed. (7th and 8th in a series. To be continued.) (E10, CI)

410-E. Some Recent Developments in Centrifugal Casting. M. L. Samuels and A. E. Schuh. *Foundry*, v. 79, July 1951, p. 78-79, 218, 220, 222, 224, 226; Aug. 1951, p. 84-89.

Recent advances in the field of centrifugal casting, particularly in the method employing metal molds. Concluding article: applications of dual-metal castings in which dissimilar metals are cast successively within a centrifugal mold. (E14, SS, CN, CI)

411-E. Beryllium Copper Sand Castings. John T. Richards. *Foundry*, v. 79, Aug. 1951, p. 90-93, 241-242, 244, 247-248, 250-256.

Foundry practice, engineering properties, structure, and uses of the four commercial Be-Cu sand casting alloys. (E11, Cu)

412-E. New Chromium Alloy Neutralizes Effect of Varying Cooling Rate in Gray Iron. Ralph A. Clark. *Foundry*, v. 79, Aug. 1951, p. 94-97.

Experience has indicated that an excellent balance between machinability and satisfactory resistance to wear can be obtained in castings treated with the new Si-Cr alloy.

Addition of this alloy has proved a thoroughly practical method of obtaining increased uniformity of hardness with a consistently pearlitic structure in this type of casting. (E25, Q9, G17, CI, Cr)

413-E. Impact Strength of Sands. Harry W. Dietert. *Foundry*, v. 79, Aug. 1951, p. 150-151.

The green compressive strength test together with green deformation gives more detailed information as to the workable strength of molding sands in a single package. These two test results allow control of bond strength and plasticity separately. Data on compressive, tensile, shear, and impact strength of five foundry sands are graphed and tabulated. (E18)

414-E. Centrifugal Casting of Pipe in Sand-Lined Molds. K. R. Daniel. *Mechanical Engineering*, v. 73, Aug. 1951, p. 644-650.

Early history, equipment, and methods. (E14, CI)

415-E. 20 mm. Fuze Noses Zinc Die Cast at High Speed. *Steel*, v. 129, Aug. 13, 1951, p. 78-79.

Process and fast plunger-type machines which cast 2700 noses per hr., meeting close ordnance specifications for structural soundness and dimensional accuracy. (E13, Zn)

416-E. Designing Parts for High Level Production by Precision Investment Casting. *Product Engineering*, v. 22, Aug. 1951, p. 136-138.

Nine examples of complex machine parts currently being mass produced to close tolerances. (E15)

417-E. Gray Iron Castings. R. L. Collier. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 378-385.

Historical sketch; methods and techniques; mechanical properties of gray iron. (E 11, Q general, CI)

418-E. Malleable Iron Castings. James H. Lansing. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 386-397.

Methods and equipment employed in production. Mechanical properties and applications. (E11, CI)

419-E. Steel Castings. Charles W. Briggs. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 398-409.

Equipment and procedures for production. (E11, CI)

420-E. High Alloy Steel Castings. W. H. Worrilow. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 410-419.

Equipment and procedures for production. (E11, CI)

421-E. Running and Feeding of Castings. H. S. Farmer. *Canadian Metals*, v. 14, July 1951, p. 18-22, 48.

Practical approach to the design of runners and feeders which will help to control foundry practice and thereby reduce scrap. (E23)

422-E. Solder—Cast Automatically. *Canadian Metals*, v. 14, July 1951, p. 46.

How molten metal is withdrawn from bottom of melting kettle and cast in a closed mold. Result is a uniform solder, oxide and dross-free. (E12, SG-f)

423-E. The Estimation of Die Casting Production Rates. H. K. Barton. *Machinery* (London), v. 79, July 26, 1951, p. 158-164.

A method applicable to the estimation of production rates and to a number of other variables involved. (E13)

424-E. Some Present-Day Practices in Patternmaking. B. Levy. *Foundry Trade Journal*, v. 91, July 19, 1951, p. 57-64.

An illustrated survey. (E17)

425-E. Problems in Castings Production. *Foundry Trade Journal*, v. 91, July 19, 1951, p. 71-74.

Round-table discussion of several miscellaneous problems. (E general)

426-E. Mass Production of Castings. William Czygan. *Foundry Trade Journal*, v. 91, July 26, 1951, p. 105-106.

Efficient handling and extensive mechanization enable a permanent-mold foundry to produce a large number of grey iron castings. (E12, CI)

427-E. Observation and Control of Dust in Foundry Dressing Operations. Part I. Control of Dust. R. F. Ottignon. **Part II. Observation of Dust.** W. B. Lawrie. *Institute of British Foundrymen*, Paper 1008, 1951, 20 pages.

New methods to observe and control the dust cloud generated during foundry dressing operations. Application of local exhaust ventilation to the dressing of small and medium-size castings. Results indicate that increased efficiency may be attained by using an air jet to control direction in which the dust cloud flows. (E24)

428-E. Mechanical Charging of Cupolas; Survey of Methods in Use and Principles Involved. W. J. Driscoll. *Institute of British Foundrymen*, Paper 1009, 1951, 23 pages.

14 references. (E10, CI)

429-E. Centrispun High-Alloy-Steel Aero-Engine Components. A. E. Thornton and J. I. Morley. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 189-205.

Part I: The Centrispinning process and its advantages and limitations from a metallurgical viewpoint. Results of mechanical tests. Part II: Physical and mechanical properties of a typical casting made by the Centrispinning process. The steels used contained 18-25% Cr and 8-14% Ni. (E14, Q general, AY)

430-E. Centrifugal Steel Castings for Gas Turbines. J. Taylor and D. H. Armitage. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 205-208.

Evolution of production and fields of application of the horizontal and vertical axis methods. Method of manufacture and stringent inspection procedure applied. Results of mechanical tests on the castings. (E14, Q general, ST)

431-E. Investment-Casting of Nozzle Guide Vanes. H. E. Gresham and A. Dunlop. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 209-212.

Modern development of the old "lost wax" process of casting as applied to the manufacture of nozzle guide vanes for gas turbines. Factors affecting dimensional accuracy and some of the creep properties of investment-cast alloys suitable for nozzle guide vanes. (E15, Q3, AY)

432-E. Precision-Casting of Turbine Blades. E. R. Gadd. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 212-216.

Turbine blade castings made successfully by the "lost wax" precision-casting method. Casting defects likely to be met, and their causes. The high-temperature fatigue properties of cast alloys, and a laboratory method for determining the resistance to thermal shock. (E14, Q7, AY)

433-E. Application of Bituminous Sand in Foundry Work. (In Portuguese.) Carlos Dias Brosch and Heitor Correa Goncalves. *Boletim da Associao Brasiliera de Metais*, v. 6, Oct. 1950. p. 366-377.

Characterizes type, application, and advantages of bituminous sand. (E18)

434-E. Problem of Gases in Aluminum and Its Alloys. (In Portuguese.) Clovis Bradaschia. *Boletim da Associcao Brasiliera de Metais*, v. 7, Jan. 1951, p. 20-35.

Role of H_2 in formation of pinholes, mechanism of their formation, and methods for elimination of gases. 26 ref. (E25, Al)

435-E. Acicular Cast Iron. (In Portuguese.) Lino A. de Lacerda Santos. *Boletim da Associcao Brasiliera de Metais*, v. 7, Jan. 1951, p. 49-65.

Criteria for obtaining best type of cast iron and for improving mechanical properties by controlling the structural components. (E25, CI)

436-E. Production of a Monobloc Type Double-Plate Aluminum Mold for Sand Casting. (In French.) Pierre Rodicq. *Fonderie*, v. 64, Apr. 1951, p. 2439-2446.

Mold is used in series on concussion machines. Advantages and disadvantages. (E10, T5, Al)

437-E. Measuring the Foundry Properties of Metals and Alloys. (In French.) Raymond Guillemot. *Fonderie*, v. 65, May 1951, p. 2459-2465.

Special divided crucible and testing apparatus for measuring fluidity, shrinkage, cavitation and other properties. 10 ref. (E10, E25)

438-E. Use of Electric Furnaces in Foundry Work With Copper Alloys. (In French.) Georges Blanc. *Fonderie*, v. 65, May 1951, p. 2467-2480.

Low and high-frequency induction, arc, radiant resistance, and resistance furnaces utilizing a crucible. (E10, Cu)

439-E. Tightness Control in French-Made Heating Equipment. (In French.) Georges Ulmer. *Fonderie*, v. 65, May 1951, p. 2481-2486.

Effect of tightness of foundry furnaces on their performance, and equipment for measuring leaks. (E10)

440-E. Removal of Slag From Cupola Furnaces. (In French.) *Fonderie*, v. 65, May 1951, p. 2487-2492.

Method of removal depends on whether slag is or is not granular. Various kinds of equipment used. (E10, CI)

441-E. Nodular Graphite Cast Irons. (In Italian.) Luigi Nava. *Metallurgia Italiana*, v. 43, June 1951, p. 221-240.

Recent industrial applications. They are easily produced, and have good properties. Treatment with Mg. 69 ref. (E25, CI, Mg)

442-E. Gray-Iron Crucible in the Aluminum Foundry. (In German.) C. Englisch. *Giesserei*, v. 38, June 14, 1951, p. 281.

Proper use of the above. (E10)

443-E. Plant Experiences and Their Application to the Hot-Blast Cupola. (In German.) O. Mattern. *Giesserei*, v. 38, June 14, 1951, p. 269-273.

Experimental results obtained from a hot-blast cupola furnace and results of a study on behavior of CO-containing stack gas. Shows how these results can profitably be applied in the operating plant. Criteria for installation of hot-blast furnaces. Experimental procedure and results. (E10, CI)

444-E. Composition of the Charge of Cast Iron. (In German.) F. A. Ebert. *Giesserei*, v. 38, June 28, 1951, p. 307-308.

Various kinds of scrap used in melting cast iron, and effect of various additions; factors in production of satisfactory cast iron. (E10, CI)

445-E. Casting a Molded Body of Aluminum Bronze. (In German.) J. Knieps. *Giesserei*, v. 38, June 28, 1951, p. 308-309.

Described and illustrated. (E11, Cu)

446-E. Determination of the Mechanical Properties of Cast Aluminum Alloys. (In German.) G. Gürtler. *Giesserei*, v. 38, July 12, 1951, p. 320-324.

Casting temperature, gas content, rate of solidification, tests on cast pieces, breaking tests, and suggestions for other tests. (E25, Q general, Al)

447-E. Melting of Copper and Its Al Alloys. (In German.) A. Fink. *Giesserei*, v. 38, July 12, 1951, p. 333-335.

Techniques for overcoming difficulties met in melting. (E10, Cu)

448-E. Recent Work on Pressure Cast Zinc Alloys. (In German.) K. Lohberg. *Metall*, v. 5, July 1951, p. 282-288.

Shows that Ph, Sn, or Cd impurities decrease resistance of Zn alloys to H_2 corrosion, and that salts are ineffective in removing impurities. Superheating likewise increases oxidation and Fe content of pressure castings, but up to 6.6% Cu has no effect on aging resistance of alloys. Physical properties and photomicrographs. 16 ref. (E13, R2, Zn)

F

PRIMARY MECHANICAL WORKING

182-F. Recent Furnace Installations by Alcoa for Production and Fabrication of Aluminum. Part II. Aluminum Fabrication at Davenport, Iowa. *Industrial Heating*, v. 18, July 1951, p. 1170-1172, 1174, 1176, 1178, 1180-1181, 1184.

Plant equipment and operations. (F21, Al)

183-F. High-Frequency Heating of Forging Billets. *Metal Progress*, v. 60, July 1951, p. 70-73.

Equipment used in a forge plant at Bromsgrove, England, using high-frequency current as heating medium. The installation deserves attention because of its design and diversity of product, and because of the fine working conditions and labor-saving arrangements. (F21)

184-F. Integrated Phosphatizing System Brings Economies in Cold Drawing. *Steel*, v. 129, July 23, 1951, p. 71-72.

Chemically bonded lubrication film trims scrap losses, lessens die maintenance in forming operations on tube, wire, rod and flat stock. Coating is a specially formulated phosphate which can be applied by immersion, flooding or spraying to form a strong, adherent film chemically bonded to the steel. (F1, G21, ST)

185-F. Design and Operation of High-Speed Production Tube Mills. Donald H. Fleig. *Welding Journal*, v. 30, July 1951, p. 589-596.

Various operations performed in a modern resistance welding tube mill are examined with a view to their coordinated functioning so as to bring about very high-speed production. Speeds from 100-200 ft. per min. are considered. (F26, CN)

186-F. The Use of Basic Open-Hearth Semi-Killed Steels in the Manufacture of Wire Mill Products. Kenneth P. Campbell. *Wire and Wire Products*, v. 26, July 1951, p. 571-573, 618-619.

Processes and material used at the Sheffield Steel Corp. (F28, ST)

187-F. Wire Mill Practices at Republic Steel Corp.'s Gadsden Plant. A. D. Gordon. *Wire and Wire Products*, v. 26, July 1951, p. 568-570, 622-623.

Operations and equipment. (F28, ST)

188-F. New Copper Alloy Developed by American Brass. *Wire and Wire Products*, v. 26, July 1951, p. 598-599.

Alloy developed for strip, wire, sheet, rod, and tube. (F general, Cu)

189-F. New Lubricant Coating Aids Cold Working of Steel. *Science News Letter*, v. 60, July 28, 1951, p. 57.

A new method which consists of cleaning, pickling, and application of a phosphate coating. A heat resistant lubricating surface is formed which is chemically interlocked with the steel. (F1, ST)

190-F. Cold Rolling Strip; An Appraisal of Today's Theory and Practice. Parts VI-VIII. (Concluded.) J. D. Keller. *Steel*, v. 129, July 9, 1951, p. 86, 90, 93; July 23, 1951, p. 78, 80, 84, 87; Aug. 13, 1951, p. 88, 91-92, 94.

Part VI: problems encountered in the strip mill operation, including wavy edges, breakages at the weld, pickup of particles, mill vibration, and skidding. Part VII: it is emphasized that the speed of rolling affects the thickness of the strip. Thickness of oil film in backup roll bearing also has an influence on rolling strip. Part VIII: explains why rolls become stiffer under high-speed rolling. Reason for end thrust and spalling of rolls. Tungsten carbide rolls. (F23, Cn)

191-F. Metallic Recuperators for Slab Heating Furnaces. R. R. Shedd. *Iron and Steel Engineer*, v. 28, July 1951, p. 55-62.

Installation of metallic tube-type recuperators on slab-heating furnaces on an 80-in. hot strip mill. Operating records. (F21, ST)

192-F. Acceleration Characteristics of Tandem Cold Reduction Mills. W. R. Harris and R. W. Moore. *Iron and Steel Engineer*, v. 28, July 1951, p. 63-72; disc., p. 72-73.

Information on design. Compares "acceleration lag" with "acceleration torque". Includes circuit diagrams. (F23, ST)

193-F. Forging of High-Alloy Steel Aided by Discovery. *Steel Processing*, v. 37, July 1951, p. 343, 352-353.

A recent patented discovery which enables difficult-to-work high-alloy steel to be forged and rolled easily. It involves addition of Ce to the steel. (F22, F23, AY, Ce)

194-F. New Process Speeds Cold Working, Extrusion of Steel. *Product Engineering*, v. 22, Aug. 1951, p. 172-173.

Foscoat Process developed jointly by Pennsylvania Salt Manufacturing Co. and Heintz Manufacturing Co. Impressive results have been obtained in such applications as tube drawing, wire drawing, deep drawing (ironing), deep stamping, cold heading, and similar cold-working operations. (F1, G21, ST)

195-F. On the Mechanism of Disruption of High-Alloyed Steels During Forging. M. V. Rastegaev. *Engineers' Digest*, v. 12, July 1951, p. 218-220, 235. (Translated and condensed.) Aug. 1950, p. 1183-1188.

Previously abstracted from *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences. See item 271-F, 1950. (F22, Q26, AY)

196-F. Art of Roll Pass Design. Ross E. Beynon. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 156-163.

A large number of roll pass details. Schematic diagrams. (F23)

197-F. Semifinished Steel. Karl L. Fetters and H. H. Hottel. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 164-177.

Deals with the steel ingot from the time it is taken from the mold until it is delivered to a finishing mill as a slab, billet, bloom, or as skelp or large wire rods. (F21, ST)

198-F. Structural Shapes and Rails. Frederick M. Gillies and Wilbur E. Dittrich. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 178-193.

A historical survey; types of mills used in rolling; design of equipment. (F23, ST)

199-F. Merchant Shapes. Fred S. High. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 194-199.

Various methods of rolling into bar shapes such as rounds, squares, flats, hexagons, octagons, angles, channels, and tees. (F23, ST)

200-F. Bars. C. W. Barrett. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 200-209.

The process of making bars from blooms or billets. Mills and techniques employed. (F23, ST)

201-F. Plates. W. Louis Bunting. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 210-229.

History of iron and steel plate production. Operational sequence of the rolling process. (F23, ST)

202-F. Butt and Lap Welded Pipe and Conduit and Electric Metallic Tubing. H. E. Engelbaugh. "ABC of Iron and Steel. Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 230-239.

Surveys the advancement of pipe manufacture from early times to the present. The lap weld, old-type butt weld, and the new continuous butt weld processes. (F26, ST)

203-F. Seamless Steel Pipe and Tubes Bryant Bannister. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 240-251.

Surveys the manufacture of seamless tubular products. The numerous and varied steps in the conversion of molten steel into pipe are presented schematically. (F26, ST)

204-F. Wire and Wire Rods. Kenneth B. Lewis. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 252-267.

Various methods for production. (F28, ST)

205-F. Strip and Sheets Hot and Cold-Rolled. Charles L. McGranahan. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 268-323.

Surveys the industry. Covers all the operations performed from the ingot to the finished hot or cold rolled sheet. (F23, ST)

206-F. Forgings. Waldemar Naujoks. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 366-377.

Development of the forging industry. Equipment in use and the various forms produced. (F22, ST)

207-F. A Strip Mill Flying Shear. *Canadian Metals*, v. 14, July 1951, p. 10-11, 14.

Problem of cutting to exact length hot strip travelling over 1000 ft. per min. (F29)

208-F. Aluminium-Alloy Forgings—A Note on Progress. Part II. C. Wilson. *Light Metals*, v. 14, July 1951, p. 367-370.

Die forging, heat treatment of forgings, and future trends. Illustrated. (F22, J general, Al)

209-F. Friction in Wire Drawing. III. The Coefficient of Friction in Wire Drawing. H. G. Baron and F. C. Thompson. *Wire Industry*, v. 18, July 1951, p. 629-633, 635.

Theories of wire drawing, and back-pull experiments and their application in calculating the coefficient of friction. 18 ref. (F28)

210-F. Effect of Warm-Working on an Austenitic Steel (G18B). G. T. Harris, and W. H. Bailey. *Iron and Steel Institute.* "Symposium on High Tem-

perature Steels and Alloys for Gas Turbines," 1951, p. 60-67.

Mechanical properties both on an experimental basis and in production. The effect of turbine disk size on the actual properties, and methods for the partial warm working of large disks. Future developments of the warm-working process apart from the gas-turbine disk field. (F general, SS, T25)

211-F. Hot Forging Tests on Some Copper-Base Alloys. A. L. Simmons. *Australian Journal of Applied Science*, v. 2, Mar. 1951, p. 76-88.

Hot forging tests carried out on a series of copper-base alloys to determine whether such tests could be used to predict the behaviour of the alloy in hot rolling. The relative plasticity of the alloys correlated well with the known relative plasticity during hot rolling, but gave no indication of the hot shortness commonly experienced with some of the alloys when hot rolled. Data are tabulated. 12 ref. (F23, Cu)

212-F. Scarfing and Gouging With the Blow-Pipe. (In French.) H. Renaudie. *Soudure et Techniques connexes*, v. 5, May-June 1951, p. 109-120; disc., p. 120-122.

Advantages of time, possibility of crust-removal, cleanliness, avoidance of further refinishing, and cutting down on costs by utilization of blow-pipe deseaming. Suitability of a similar process, gouging, for larger pieces. (F21, ST)

213-F. Shaping of Steel Plate. (In French.) R. Dupas. *Métallurgie et la Construction Mécanique*, v. 83, June 1951, p. 463-465.

Stamping, hammering, elongation, cambering, cutting, and punching. (F29, ST)

G
SECONDARY MECHANICAL WORKING

258-G. Heavy Equipment for Making Large Road Building Machines. *Automotive Industries*, v. 105, July 15, 1951, p. 34-35.

Large presses for blanking and forming. Heavy welding using both hand and machine methods, particularly the hidden-arc process. (G1, K1, T4)

259-G. Stretch Forming With Flexible Equipment. *Automotive Industries*, v. 105, July 15, 1951, p. 38-39.

Method for flexible stretch forming now in use at Northrop Aircraft, Inc. (G9)

260-G. Many Close-Tolerance Operations in Machining Ford-Mercury Automatic Transmissions. Joseph Geschelin. *Automotive Industries*, v. 105, July 15, 1951, p. 46-50, 96, 100, 102, 104.

An introductory study of automatic transmission manufacture. Major highlights of operations at Warner Gear Plant. (G17, T21)

261-G. Expanding Rubber Forms Parts. Thomas L. Self. *Aviation Week*, v. 55, July 23, 1951, p. 32, 34, 39.

Technique for forming metal to complex contours by an internal expanding rubber die. (G8, Al, CN)

262-G. Flame-Cutting Steel With Propane. *Foundry Trade Journal*, v. 91, July 5, 1951, p. 10.

Experiments carried out in Germany with acetylene and propane to determine which is more suitable for cutting purposes. Features of propane. (G22, ST)

263-G. Phosphate Lubricant Aids Cold Extrusion of Steel. *Iron Age*, v. 168, July 26, 1951, p. 76-77.

Cold extrusion of steel has been made easier with a phosphate lubricant. This new lubricant cuts down tool maintenance and down-time and has increased cold working output rates. (G21, CN, AY)

264-G. Hot Brass Pressing. *Machinery* (London), v. 79, July 5, 1951, p. 20-25.

Typical procedure of the Deritend Stamping Co., Ltd. Illustrations of machinery used, and discusses treatment and metallurgical control of the metal. (G1, Cu)

265-G. Making the Ferguson Plough. *Machinery* (London), v. 79, July 12, 1951, p. 47-55.

Production methods. Details on grinding, drilling and shaping of parts. (G general, T3)

266-G. The Autofrettage Treatment of Gun Barrels. *Machinery* (London), v. 79, July 12, 1951, p. 59-61.

Autofrettage process as a means of inducing hoop stresses in the barrels. The effective yield point of the material and tensile strength are considerably increased. (G23)

267-G. Effect of Structure on Machinability Demonstrated. Norman Zlatin and Leonard Nowikowski. *Iron Age*, v. 168, Aug. 2, 1951, p. 95-98.

Investigation of 3140, 4140, and 8640 steel shows that machining properties are the same when they have been heat treated to the same structure. Structure is a better criterion of machinability than chemical composition. Differences in structure mean less when carbide tools are used. Resulfurizing to about

0.1% improves machinability. Includes photomicrographs and graphs. (G17, M27, AY)

268-G. Frame Cutting Multiple Parts for Diesel Locomotives. Harry S. Swan. *Steel Processing,* v. 37, July 1951, p. 332-335, 361.

Illustrates and describes the operation. (G22, T23)

269-G. How to Lower the Cost of Prototype Stampings. O. H. Wismer. *Steel Processing,* v. 37, July 1951, p. 340-342.

Tooling costs can be lowered by eliminating intermediate mockups or patterns whenever possible, and by using wood, plastic, or similar material as a substitute for metal in mated dies. (G3)

270-G. Flame Processes Assist Pipe Fabrication. Edgar P. Auler. *Welding Engineer,* v. 36, Aug. 1951, p. 22-25, 56-57.

Application of oxyacetylene flame-cutting, flame-gouging, and flame heating, to steel pipe fabrication. Benefits are cited. (G22, J2)

271-G. A More Realistic Measure of Shot Peening Effectiveness. Charles Lipson. *Steel,* v. 129, Aug. 6, 1951, p. 72-75.

Fatigue strength, not fatigue life, is said to be a more logical yardstick to apply to determine improvement in performance of surface-treated parts subject to fluctuating loads. Nine factors are evaluated on this basis. 17 ref. (G23, Q7, ST)

272-G. Raising the Limits on Carbide Machining. W. P. Coomey. *Tool Engineer,* v. 27, Aug. 1951, p. 29-31.

Factors to be considered in evaluating possibility of use of higher speeds. (G17)

273-G. Engineering "Know How" Makes Possible World's Largest Pipe Bends. *Industry & Welding,* v. 24, Aug. 1951, p. 28-29, 68-69.

An ingenious method for bending large diameter pipe—up to 8 ft. in diameter—developed by M. W. Kellogg Co. (G6)

274-G. Vibratory Press Speeds Swaging Job 800 Pct. *Iron Age,* v. 168, Aug. 9, 1951, p. 71.

An 8-ton oil-hydraulic press with unique tooling used to swage caulking-gun tips from ½-in. steel tube. (G1)

275-G. Designing Drawing and Redrawing Dies. C. W. Hinman. *Modern Machine Shop,* v. 24, Aug. 1951, p. 154-156, 158, 160, 162, 164.

Recommended practice for drawing 18-8 stainless steel. (G4, SS)

276-G. Transparent Cutting Oils Offer Important Advantages. J. C. Van Gundy. *Machinery* (American), v. 57, Aug. 1951, p. 177-180.

The primary advantage of transparent cutting oils is that the operator can observe the cutting tool and workpiece through the fluid. Active type sulfurized cutting oils, noncorrosive type cutting oils, and oils used in grinding operations are discussed. (G21)

277-G. Engineering for Producibility. Roger W. Bolz. *Machine Design,* v. 23, Aug. 1951, p. 133-156.

Setting up of the organization, designing for economy, production design, cost and quality. Tables give machinability ratings of a wide variety of metals and alloys, also relative "severity" of different machining operations. (G17)

278-G. Deep Drawing From Heavy-Gauge Steel Plate. Ulrich Bauder. *Engineers' Digest,* v. 12, July 1951, p. 212-215. (Translated and condensed.)

Previously abstracted from *Stahl und Eisen.* See item 215-G, 1951. (G4, ST)

279-G. Deep Draw Production of Automobile Bumper Guards. *Magazine of Tooling and Production,* v. 17, Aug. 1951, p. 54-55.

Production methods. (G4, ST)

280-G. Review of Power Cutting Processes. Parts 2 and 3. R. E. Dore. *Welding & Metal Fabrication,* v. 19, June 1951, p. 217-223; July 1951, p. 253-258, 268.

Health safeguards and operational data relating to the flux-injection, the Fe-powder, and the oxy-kinetic processes. Metallurgical aspects. Deals exclusively with steels. (G22, ST)

281-G. Cleaning Castings by Oxy-Acetylene. *Canadian Metals,* v. 14, July 1951, p. 23.

In new process, called Powder-Washing, an iron-rich powder is fed through oxy-acetylene preheat flames into a low-velocity oxygen stream where it burns and produces super-heated liquid iron oxide. Heat from combustion of the powder and from the slag simplifies and speeds removal of metal and metal-sand mixtures. (G22)

282-G. Preparing Plate Edges for Production Welding. C. A. Heffernon. *Machinery* (London), v. 79, July 26, 1951, p. 147-151.

Equipment used in providing different edge forms. The types of machines are either cutting apparatus which travels along a straight-line track or fixed apparatus, past which the material is moved. (G22, ST)

283-G. Machining Austenitic and Ferritic Gas-Turbine Steels. K. J. B. Wolfe and P. Spear. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 233-242.

Previously abstracted from *Aircraft Production.* See item 167-G, 1951. (G17, AY, SS)

284-G. Trimming Light Alloys. (In French.) *Fonderie,* v. 65, May 1951, p. 2483-2494.

Methods of trimming with a saw and by grinding. (G17, G18, Al, Mg)

285-G. Some Aspects of Steel Machinability. (In Italian.) L. Locati and T. Natale. *Metallurgia Italiana,* v. 43, May 1951, p. 164-169.

Determination of index for machinability from temperature of tool point, and application to case hardened and free-cutting steels. 14 ref. (G17, ST)

286-G. A Study of Tool Cutting Capacity. (In Italian.) M. Cociglio. *Metallurgia Italiana,* v. 43, May 1951, p. 170-175.

Reviews the literature and suggests a method based on wear at constant speed and path. (G17, ST)

H
POWDER METALLURGY

65-H. Design in Powder Metallurgy. H. W. Greenwood. *Metal Industry,* v. 79, July 6, 1951, p. 3-5; July 13, 1951, p. 31-33.

Basic principles of design of parts, dies, and tools in the field of powder metallurgy. Design steps, effect of powder composition, techniques, and physical properties of molded pieces. The general rules covering shape and thickness of parts. Factors governing design of dies and punches. Economic aspects of design in powder metallurgy. (H general)

66-H. Powder Metallurgy of Zirconium. Henry H. Hausner, Herbert S. Kalish, and Roswell P. Angier. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 625-633.

How Zr of high purity can be fabricated by powder metallurgy methods. Use of ZrH powder for compacting and sintering leads to a more superior product than does use of Zr powder. Pressing and sintering conditions that permit the powder-metallurgical fabrication of Zr are established. Tests on physical characteristics. 13 ref. (H14, H15, Zr)

67-H. Powdered Metal Parts. Irving J. Donahue. *Western Machinery and Steel World,* v. 42, July 1951, p. 84-86, 96.

Operations at the Powdered Metal Division of Kwikset Locks, Inc. Advantages of the process. (H general)

68-H. The Economy of Good Design in Powder Metallurgy. H. W. Greenwood. *Machinery Lloyd* (Overseas Ed.), v. 23, July 21, 1951, p. 83, 85-86.

A general discussion. (H general)

69-H. Sintered Alloys for High-Temperature Service in Gas Turbines. R. W. A. Buswell, W. R. Pitkin, and I. Jenkins. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 258-268.

A cobalt-base alloy of the Vitallium type of low porosity was developed by powder-metallurgy methods to compare properties of an alloy prepared by a straightforward sintering process and a similar cast alloy. Possibility of improving the high-temperature strength by the introduction of refractory oxides such as thoria. The effect of aging on mechanical properties and the significance of crystallographic transformation during aging. 11 ref. (H15, T25, Co, SG-h)

70-H. Obtaining Continuous Bands by Rolling Powdered Iron. (In French.) *Métallurgie et la Construction Méchanique,* v. 83, Mar. 1951, p. 179-181; Apr. 1951, p. 261-263, 265-266.

Size of rolling groove, thickness of rolled bands, cylinders used and rate of rotation, technical comparison and rolling, duration and temperature of sintering, compression of sintered bands, and manufacture of sheet iron. (H14, Fe)

71-H. Studies of the Sintering Mechanism. (In French.) P. Laurent and M. Eudier. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 271-275.

Theories and physical characteristics of sintering as applied in powder metallurgy. Data for Fe and Cu. 11 ref. (H15, Fe, Cu)

72-H. Trends in the Development of Powder Metallurgy. (In German.) P. Schwarzkopf. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, June 1951, p. 161-170.

Surveys recent developments. 38 ref. (H general)

J
HEAT TREATMENT

196-J. Hardening Compound Carburizes, Nitrides and Chromizes Steel. E. M. Ellsworth. *Materials & Methods,* v. 34, July 1951, p. 86-88.

Recently developed fast acting steel-hardening compounds that harden cutting edges and increase wear resistance by three-way action. Use, advantages, and limitations of the compounds. (J28, L15, CN)

197-J. Boron Steels for Constructional Parts and for Carburizing. Porter R. Wray. *Metal Progress,* v. 60, July 1951, p. 52-55.

For the majority of applications for the constructional alloy steels, boron can probably replace a sizable quantity of Ni, Cr, Mo, and other critical alloys where their presence is necessary only for ade-

quate hardenability. Includes hardenability and workability data. (J26, J28, Q23, AY)

198-J. Nitriding Stainless Steels for Better Wear Resistance. Sidney Low. *Steel*, v. 129, Aug. 6, 1951, p. 82, 84, 87.

Cycle of 40 hr. at 1000° F., in dissociated and ionized ammonia, following heat treatment, removes oxide layer by nascent hydrogen and is adaptable to conventional furnace equipment. (J28, SS)

199-J. Machine Cuts Heat Treat Furnace Loading Costs. W. G. Patton. *Iron Age*, v. 168, Aug. 9, 1951, p. 68-70.

An automatic loading machine which is successfully feeding a single heat treating furnace with small parts of uniform size on a 24-hr. continuous basis. Working with screw-machine parts and assorted small stampings, the machine has eliminated fatigue in furnace loading and effected marked labor savings. Estimates place the increase in furnace output at 10%. (J general)

200-J. Which Surface Hardening Process? Lester Spencer. *Product Engineering*, v. 22, Aug. 1951, p. 157-162.

Discusses factors to be considered in answering above question. Tables and graphs give data on surface hardening of ferrous materials by different methods. Large chart gives basic characteristics, hardness range, depth of case, typical applications, steels used, heat treatments, advantages, and disadvantages of the seven processes covered. (J28, ST)

201-J. A Controlled System of Heat Treating. *Magazine of Tooling and Production*, v. 17, Aug. 1951, p. 140, 145.

Process which uses a heat treating furnace, a loader, and a quench tank, all in one compact unit. (J26)

202-J. The Function of Energizers in Pack Carburizing. A. Hultgren. *Journal of the Iron and Steel Institute*, v. 168, July 1951, p. 245-259.

A number of small-scale pack-carburizing tests were made on a low-carbon steel, mainly at a carburization temperature of 925° C. Various ways in which the energizers K_2CO_3, Na_2CO_3, and $BaCO_3$ may be placed in the box with crushed charcoal and with the objects to be carburized are investigated, and also the effect on carburization of different methods of sealing the box. Experiments to determine the reactions that take place in a carburizing box. (J28, CN)

203-J. Heat-Treatment of Grey Cast Iron; Report and Recommendations of Sub-Committee T.S. 31. *Institute of British Foundrymen*, Paper 1012, 1951, 8 pages. (J general, CI)

204-J. Gaseous Nitriding. Allan Morgan. *Australasian Engineer*, June 7, 1951, p. 82-89.

An explanation of the mechanism of nitriding. The composition and condition of supply of the various grades of Nitralloy. Preparing the material for nitriding and the nitriding process itself. Necessary precautions, typical applications and limitations to the use of nitrided Nitralloy. 11 ref. (J28, AY)

205-J. Economic Aspects of Controlled Atmospheres. (In French.) Félix Barbas. *Métallurgie et la Construction Mécanique*, v. 83, May 1951, p. 169, 171, 173, 175, 177.

Investigated for electric muffle furnaces. Physical and physicochemical phenomena of furnaces, deoxidation of confined atmospheres, and advantages of controlled atmospheres in metal heat treating. (J2)

206-J. Nitriding of Various Kinds of Steel. (In French.) Jean Daurat. *Métallurgie et la Construction Mécanique*, v. 83, Apr. 1951, p. 255-258, 266; May 1951, p. 363-371; June 1951, p. 479-481, 483.

Preliminary heat treatment, hardness, and effect of foreign bodies in surface nitriding processes. Properties of nitrided cases for ten common types of steel, as well as properties of nickel, graphite, austenitic steels, and cast iron. Nitriding procedure. (J28, ST)

207-J. Quenching and Aging Phenomena in Aluminum-Magnesium Alloys. (In French.) Marcel Armand. *Revue de l'Aluminium*, v. 28, June 1951, p. 220-226.

Normalized and quenched Al-Mg alloys show aging similar to duralumim and some other alloys at room temperature. At higher temperatures a structural modification occurs due to a precipitated phase oriented toward certain crystallographic planes. Kinetics of phenomena depend on rate of cooling after normalization. (J27, N7, Al, Mg)

208-J. Effect of Heat Treating on the Strength of Propellers Made of Al-Zn-Mg Alloys. (In German.) Franz Bollenrath, Walter Bungardt, and Hanns Gröber. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 463-469.

Notched and unnotched specimen of above alloys were used for fatigue and creep-stress resistance tests made to determine effect of heat treating and alloy composition. Method of experimentation. (J general, Q3, Q7, Al, Zn, Mg)

K

JOINING

440-K. Strength Behavior of Adhesive Bonds. H. P. Meissner and G. H. Baldauf. *Transactions of the American Society of Mechanical Engineers,* v. 73, July 1951, p. 697-702; disc., p. 702-704.

Tests on butt joints between metal cylinders using eutectic solder, wax, and polystyrene as adhesives indicate that the increase of bond strength is due primarily to the distribution of internal stresses in the adhesive layer. 14 ref. (K12, Pb, Cu)

441-K. Welding and Metals in Shipbuilding. C. F. Tilson. *Australasian Engineer,* May 7, 1951, p. 60-64.

Advancement of welding techniques used in shipbuilding. Application of various metals. (K general, T22, CN, SS, Cu, Al)

442-K. The Welding of Aluminium Alloys. *Australasian Engineer,* May 7, 1951, p. 65-69.

Methods of welding Al alloys: gas welding, metallic arc, carbon arc and atomic hydrogen. Techniques and applications. Methods of inspecting welds. Some types of machines and electrodes used in spot welding. (K1, K3, Al)

443-K. Stitch It Instead. Part II. A. G. Denne. *Iron Age,* v. 168, July 26, 1951, p. 78-82.

Types of stitching. Stitch penetration is limited by shear resistance of work. Al, steel, stainless, brass and Cu are commonly joined with themselves or to nonmetallic materials. Good stitching practice is necessary for best ultimate shear and tensile strengths. (K13, Al, CN, SS, Cu)

444-K. Methods of Joining Wrought Aluminium Alloys. Maurice Cook. *Light Metals,* v. 14, June 1951, p. 327-329; July 1951, p. 370-378.

Includes riveting, welding, brazing, soldering and nonmetallic bonding. (K general, Al)

445-K. Use of Notch-Coil Rings Boosts Brazing Production 62 Percent. *Machine and Tool Blue Book,* v. 47, Aug. 1951, p. 273-275.

Brazing of rings for electrical transformer connectors. (K8)

446-K. Flexible Sealers Find Wide Use in Industry. Kenneth Rose. *Materials & Methods,* v. 34, July 1951, p. 66-69.

Several types of materials available for sealing openings to prevent leakage of gas or liquid or to deaden vibration. Base materials include rubber, asphalt, vegetable oil, and synthetic resin. Industrial applications. (K12)

447-K. Structural Adhesives—Their Advantages, Their Limitations, Their Future. William E. Dirkes. *Materials & Methods,* v. 34, July 1951, p. 80-83.

Different types of adhesives, applicable to use in aircraft metal bonding, particularly epoxide resin. Problems involved. (K12)

448-K. Ultrasonic Soldering. *Metal Industry,* v. 79, July 13, 1951, p. 33.

An ultrasonic soldering bath which can be used in the rapid tinning of small, complex-shaped, aluminum and aluminum alloy articles. (K7, Al)

449-K. Series-Arc Welding. *Metal Progress,* v. 60, July 1951, p. 138, 140, 142. (Condensed from "Welding With Multiple Electrodes in Series—A New Method of Unionmelt Welding," by A. R. Lytle and E. L. Frost.

Previously abstracted from *Welding Engineer* and *Welding Journal.* See items 37-K and 120-K, 1951. (K1)

450-K. Adequate Instrumentation Minimizes Welding Variables. J. Heuschkel. *Steel,* v. 129, July 23, 1951, p. 66-69, 88, 90.

Close control of all welding factors can result in major savings in manhours and dollars by guaranteeing consistently good results. Suitable welding conditions can be duplicated and poor operational practices avoided. Covers principally resistance welding, but includes instrumentation for arc welding, gas welding and brazing. (K3, K general)

451-K. "Push-Button" Soldering and Brazing. C. E. Eadon-Clarke. *Welding and Metal Fabrication,* v. 19, July 1951, p. 247-252.

Radio-frequency induction heating, resistance heating, and "Stanelco" electro-gas process, which can be push-button operated and process controlled for use by semi-skilled personnel in brazing and soldering operations. Data on comparative results of the methods are tabulated. (K7, K8)

452-K. Welding Copper - Bearing Stainless Steels. Helmut Thielsch. *Welding Journal,* v. 30, July 1951, p. 341s-347s.

Properties of weldments and effects of composition, heat treatments, welding technique, and welding processes of various commercial and experimental welding electrodes developed here and abroad. 20 ref. (K1, SS)

453-K. Welding Continuous Frames and Their Components. Progress Report No. 3: Plastic Design and the Deformation of Structures. Ching Huan Yang, Lynn S. Beedle and Bruce G. Johnston. *Welding Journal,* v. 30, July 1951, p. 348s-356s.

A study of the plastic behavior of continuous beams, the deformation of structures in the plastic range and a criterion for selection of the full load in the plastic design method. (K9, Q23, T26)

454-K. Connections for Welding Continuous Portal Frames. Progress Report No. 4: Part I. A. A. Toprtsoglou, Lynn S. Beedle and Bruce G. Johnston. *Welding Journal,* v. 30, July 1951, p. 359s-384s; disc., p. 384s.

An investigation of portal-type structure with various types of corner connections. Results of strength, yield and stiffness of several types of corner connections are indicated. 32 ref. (To be continued.) (Q23, K1, G22, T26, ST)

455-K. Field Welding of Aluminum Tanks. Perry C. Arnold. *Welding Journal,* v. 30, July 1951, p. 597-601.

How several large aluminum storage vessels were erected, including welding sequence to avoid distortion and warpage. The inert-gas shielded-arc method has made possible the strong, ductile, high-quality weldments that make quantity production possible. (K1, Al)

456-K. Stress Concentration Problems in Welded Construction. G. J. Green and D. H. Marlin. *Welding Journal,* v. 30, July 1951, p. 607-617.

Factors in stress concentration. Notches, design, welding defects, fabrication and welding tools, welding techniques, and related metallurgical factors, with illustrative examples. Methods of correcting some of the problems are given. (K general, Q25)

457-K. Sigma Welding of Nonferrous Metals and Alloy Steels. H. T. Herbst. *Welding Journal,* v. 30, July 1951, p. 618-631.

Hand and machine shielded inert-gas metal-arc welding and hard facing application. Equipment, atmosphere, and method for welding Al, Cu, Cu-alloys, carbon steel and stainless steel. (K1, L24, Al, Cu, CN, SS)

458-K. Quality Control of Structural Resistance Welding in Aircraft. J. R. Fullerton. *Welding Journal,* v. 30, July 1951, p. 631-633.

How basic standards for quality and procedures are outlined in the current military specifications for spot and seam welding of aircraft materials which can be modified to suit the facilities and requirements of an individual factory. (K3, T24)

459-K. Design Data for Brazing. Part II. Filler Metals and Fluxes. Part III. Basic Design of Joints for Brazing. W. J. VanNatten. *Welding Journal,* v. 30, June 1951, p. 540-543; July 1951, p. 634-637.

Advantages, limitations, composition, characteristics, and recommended clearances for the following groups of brazing alloys and fluxes: Cu, Ag alloys, and Al alloys. Part III: principal type of joints and design information for each. (K8, Cu, Ag, Al)

460-K. Welding Trims Steel From Heavy Trusses. LaMotte Grover and Gilbert D. Fish. *Engineering News-Record,* v. 147, Aug. 2, 1951, p. 30-32.

Changing from riveting to welding reduced steel tonnage about 30% for three heavy trusses in new additions to Mt. Sinai Hospital, New York City. (K1, T26, CN)

461-K. Bolted Joints Found Better Under Fatigue. T. R. Higgins. *Engineering News-Record,* v. 147, Aug. 2, 1951, p. 35-36.

Laboratory tests and field experience have demonstrated the superiority and economy of structural steel connections made with high-tensile steel bolts. In comparison with ordinary riveted and bolted connections, these bolts are particularly advantageous for structures subjected to widely fluctuating dynamic loading. (K13, CN)

462-K. Stud Welding Comes Aboard. *Marine Engineering and Shipping Review,* v. 56, Aug. 1951, p. 68-70.

Shipbuilding applications of stud welding. (K1)

463-K. Design for Flashwelding. Gilbert C. Close. *Industry & Welding,* v. 24, July 1951, p. 24-26; Aug. 1951, p. 34, 37, 55-57.

An illustrated description of the process and its advantages. Part II: inspection procedures and new applications. (K3)

464-K. Efficient Use of Welding Fittings. George Hart. *Industry & Welding,* v. 24, Aug. 1951, p. 44-45, 47-48, 52.

Use of fittings in pipe outlets. (K1, K2)

465-K. Welding the Navy's Warplanes. Howard E. Jackson. *Modern Machine Shop,* v. 24, Aug. 1951, p. 100-104.

Equipment and facilities at Sand Point Naval Station for welding and testing the welds. (K9)

466-K. Low Melting Temperature Solders in Metal-Ceramic Seals. R. J. Bondley. *Ceramic Age,* v. 58, July 1951, p. 15-18.

By use of ductile-metal solders and Ti hydride, nonmetallic materials having widely different physical properties can be soldered to metals or other nonmetallic substances. The joints formed are strong and, if properly made, completely vacuum proof. (K7, SG-f)

467-K. Induction Brazing—Short Cut to Greater Output. John A. Evans. *Welding Engineer,* v. 36, Aug. 1951, p. 18-21.

Steel below the Curie point (1420° F) can be heated about 100 times as fast by induction heat as with a furnace having a wall temperature of 2000° F. (K8, ST)

468-K. Cleaning Costs Took a Nose Dive. Jack Medoff. *Welding Engineer,* v. 36, Aug. 1951, p. 30-32.

Refers to the cleaning of Japanese ship-cargo tanks for transportation of vegetable oil. Use of stainless steel tanks reduced the cost of between-trip cleanings from the $3000-$4000 range to less than $1000. Welding details. (K1, SS)

469-K. Fabricated Beams for Welded Buildings. Ross Yarrow. *Welding Engineer*, v. 36, Aug. 1951, p. 33-35.

Briefly discusses each of the main processes involved in structural fabrication, including design detailing, templates, layout, punchings, fitting, welding, inspection, and erection. (K1, T26, CN)

470-K. Welded Aluminum Piping. Dan R. Cheyney. *Welding Engineer*, v. 36, Aug. 1951, p. 36-39.

Details of inert-arc welding process, thermal effects, allowable design stresses, selection of alloys, and advantages over other types. (K1, T27, Al)

471-K. Welded Sphere for Liquid Nitrogen. Fred M. Burt. *Welding Engineer*, v. 36, Aug. 1951, p. 40-42.

Fabrication from curved segments of Type 347 stainless 3½ in. thick. (K1, T26, SS)

472-K. Oxygen-Argon Mixture Speeds Sigma Welding of Steels. *American Machinist*, v. 95, Aug. 6, 1951, p. 154-155.

A new principle which multiplies the speed of sigma welding of stainless and carbon steel. A mixture of O_2 and A was used as a shielding atmosphere. (K1, SS, CN)

473-K. How to Get Better Welding Results With 17% Chromium Stainless. T. A. Pruger. *Steel Horizons*, v. 13, No. 3, 1951, p. 10-12.

One possible substitute for Cr-Ni or austenitic stainless steels is Type 430 or 17% Cr stainless. Its main drawback is low ductility after welding, possible added costs of fabrication, and lower corrosion resistance as compared with austenitic grades. Results of experiments on effects of various heat treatments on ductility, also of atmospheric weathering and laboratory corrosion tests, on this material. Recommended arc welding and heat treating procedures. (K1, J general, SS)

474-K. Welding Characteristics of Open Hearth and Bessemer Seamless Steel Pipe. A. B. Wilder, W. B. Kennedy, and F. W. Crouch. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 763-780; disc., p. 781-788.

Welding characteristics of ASTM Specification A-53 Grade B, seamless steel pipe, especially properties related to deoxidation and steelmaking practice. Properties of girth welds and laboratory bead welds. Tension and bend tests were made on girth welds. A new type of weldability test is the weld-bead flattening test for tubular products. Internal structure and hardness of the girth and bead welds and advantages of multipass welding. Impact properties of the girth welds. (K9, Q general, CN)

475-K. Welds Between Dissimilar Alloys in Full-Size Steam Piping. R. U. Blaser, F. Eberle, and J. T. Tucker, Jr. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 789-808; disc., 858-860.

Factors affecting the safe operation of ferritic-austenitic weld joints in large-size steam piping were studied by means of a simulated proof test. The specimen consisted of a 10¾-in. diam. section of 2¼ Cr + 1 Mo steam pipe welded to end-pieces of 18 Cr + 8 Ni-Cb wrought and 16 Cr + 13 Ni + 2 Mo-Cb cast materials, using 19 Cr + 9 Ni-Cb. welding electrodes. Cracks were detected by radiographic means in the pipe at the edge of the weld after 4631 hr. at 1100° F. and 1500 psi., involving 47 shutdowns to atmospheric conditions. Metallurgical examination showed the principal factors contributing failure. (K7, AY, SG-h)

476-K. Some Considerations in the Joining of Dissimilar Metals for High-Temperature High-Pressure Service. O. K. Carpenter, N. C. Jessen, J. L. Oberg, and R. D. Wylie. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 809-857; disc., p. 858-860.

Metallurgical factors, performance, and fabrication of joints. Failures of field welds of dissimilar metals under severe operating conditions are shown as examples. Welding techniques and developments designed to minimize possibility of failure. Stabilization of carbides in the ferritic materials was studied. (K9, SS, AY)

477-K. The Measurement of Dynamic Modulus in Adhesive Joints at Ultrasonic Frequencies. A. G. H. Dietz, P. J. Closmann, G. M. Kavanagh, and J. N. Rossen. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 1414-1426; disc., p. 1427.

Equipment for obtaining the necessary resonance properties, the resonant frequency and half-power band width. Measurements were made on stainless-steel bar specimens, cemented with a phenol-formaldehyde adhesive, which were subjected to various heat treatments. Results indicate that the measured dynamic modulus is useful for selecting from a group of treated specimens those which have deteriorated and have low tensile strength. The method is applicable to cemented-bar specimens composed of other types of bars and adhesives, provided that certain conditions are met. (K13, Q23)

478-K. Weld That Defective Casting! *Canadian Metals*, v. 14, July 1951, p. 24-26, 28.

How recovery of defective iron castings can be achieved by proper use of repair welding. (K general, CI)

479-K. 600-Amp. Argon-Arc Torch for Manual Welding Thick Aluminum Alloy Plate. J. H. Cole. *Welding Research*, v. 5, Apr. 1951, p. 157r-162r.

Construction and operating characteristics of a manual torch capable of carrying up to 600 amp. Experimental butt and fillet welds in 1-in. Al alloy using a single-pass technique. (K1, Al)

480-K. Machine Characteristics for Flash Welding Aluminium Alloys. H. E. Dixon and J. H. Gameson. *Welding Research*, v. 5, Apr. 1951, p. 163r-172r.

A summary of existing information on the flash welding of light alloys. Properties of light alloys and their likely effect on desirable machine characteristics. Data on physical and mechanical properties of materials and welds are tabulated. 26 ref. (K3, Al)

481-K. The Fabrication of Heavy Welded Pressure Vessels. *Machinery* (London), v. 78, June 21, 1951, p. 1019-1028.

Forming and welding equipment and procedures of British plant. (K general, G1, T26, CN)

482-K. The Fabrication of Heavy Welded Pressure Vessels. *Machinery* (London), v. 79, July 19, 1951, p. 108-112.

Procedures and equipment of a British plant, specifically for fusion welding the seams, radiographic examination, and thermal stress relief. (K general, T26, S13, J1, ST)

483-K. Correspondence on the Paper —Effect of Cooling Rate and Composition on the Embrittlement of Weld Metal. *Journal of the Iron and Steel Institute*, v. 168, July 1951, p. 259-260.

Deals with paper by E. C. Rollason and R. R. Roberts (v. 166, p. 105-112; see item 697-K, 1950.) Includes author's reply. (K9, Q23, CN)

484-K. Welding in Relation to Gas Turbines for Use on Land. J. M. Robertson. *Transactions of the Institute of Welding*, v. 14, June 1951, p. 68-73.

The welding application and problems involved vary with the type of turbine concerned. Where the turbines resemble aircraft types from the point of view of the size of the components and assemblies, the welding applications and problems are similar to those that arise in connection with aircraft units, and, where the turbines resemble large steam turbines, the welding applications and problems have much in common with those involved in high-temperature steam plant. Materials used such as ferritic steels containing alloying elements and austentic steels are considered. 10 ref. (K general, T25, SS, AY)

485-K. Developments of Design and Fabrication in Recent British Structures. W. S. Atkins and E. M. Lewis. *Transactions of the Institute of Welding*, v. 14, June 1951, p. 74-84.

Describes two welded structures in Great Britain which are now nearing completion. (K general, T26, CN)

486-K. Welding on Gas Turbine Engines for Aircraft. H. E. Lardge. *Transactions of the Institute of Welding*, v. 14, June 1951, p. 85-91.

Fusion and resistance welding processes are used in the construction of gas-turbine engines for aircraft. A brief description of a typical jet-propulsion engine, together with some remarks on the materials used. (K1, K2, K3, T25, AY, CN)

487-K. Welding of Heat-Resistant Alloys in Sheet Form. H. E. Lardge. *Iron and Steel Institute*. "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 217-224.

Sheet-metal parts of a typical jet propulsion unit. Characteristics of the austenitic steels and high nickel-chromium alloys which intimately affect welding. Use of the oxy-acetylene torch and the carbon, argon, and metallic-arc processes. Techniques developed for the resistance processes of spot, stitch, and seam welding, as applied to gas-turbine work. The electrical resistance hot-riveting process. 10 ref. (K general, SS, AY)

488-K. Weld-Metal Properties and Welding Characteristics of Two Austenitic Steels Used for Gas-Turbine Rotors. E. Bishop and W. H. Bailey. *Iron and Steel Institute*. "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 225-232.

The room-temperature mechanical properties of all-weld-metal specimens, and of numerous butt-joints welded in 1-in. thick plates of the corresponding steels are reported. The welds were radiographed, and transverse sections were cut for mechanical testing. The mechanical properties of the welded joints, as-welded and after heat treatment, were investigated at room temperature. Also included are the creep properties at appropriate high temperatures. 12 ref. (K9, AY)

489-K. Automatic or Manual Welding? (Continued.) (In German.) Hermann Stern. *Schweisstechnik*, v. 5. Apr. 1951, p. 40-46; May 1951, p. 49-56.

Important factors in manual electric-arc welding, and mechanical, metallographic, and X-ray analysis of the resulting welds. A description of different processes, property tests and comparison of automatic and manual welding procedures. 36 ref. (K1)

490-K. Argon Arc Welding of Aluminum. (In German and French.) E. Zurbrügg. *Aluminium Suisse*, July 1951, p. 115-124.

Principles of argon-arc welding with d.c. and a.c. current; required equipment; condition of protective gas; advantages and possible applications; and details of welding procedure. 11 ref. (K1, Al)

491-K. Proper Designs for Lead Welding. (In German.) C. G. Keel. *Zeitschrift für Schweisstechnik*, v. 41, July 1951, p. 119-124.

Methods of joining lead tubes by welding. (K general, Pb)

L

CLEANING, COATING AND FINISHING

537-L. Vitreous Enamel for Aluminum. William F. Carroll. *American Ceramic Society Bulletin*, v. 30, July 1951, p. 232-233.

A low-melting enamel for use on aluminum was developed, based on a phosphate glass. The enamel was attacked by strong acids and alkalis but was unaffected by extended exposure to boiling water. Some protective layer was found to be necessary to prevent reaction between the aluminum and the enamel; copper was found most successful for this purpose. Good white was obtained, using TiO_2 as opacifier. Satisfactory colors can be obtained. (L27, Al)

538-L. Ceramic Coatings Prevent Exhaust-Gas Corrosion. *Better Enameling*, v. 22, July 1951, p. 6-7, 30.

Five heat resisting alloys were investigated: Inconel, Types 347 and 19-9DL stainless steels, Vitallium, and S-816. Specimens of each alloy with five different coating conditions were studied: an uncoated specimen, a preoxidized specimen, and three ceramic-coated specimens. (L27, Ni, SG-h)

539-L. Bending Steel Plate in 180° Arc Doesn't Loosen Its Plastic Corrosion-Resistant Coating. *Chemical Processing*, v. 14, July 1951, p. 18.

Sample metal plate covered with U. S. Royalguard air-drying plastic coating is bent through a 180° arc to demonstrate its flexibility and adhesion. The coating neither chips nor cracks, and can be used on steel, aluminum, concrete, hard wood, or composition board. (L26, CN, Al)

540-L. Progress in Metal Spraying Equipment. H. J. Plaster. *Electroplating and Metal Finishing*, v. 4, July 1951, p. 215-217.

Reviews developments. (L23)

541-L. Material Economy. Frank Wild. *Electroplating and Metal Finishing*, v. 4, July 1951, p. 218-220.

Conservation of cleaners and swills, anodes, acids, etc., used in electrochemical processes. (L17, A8)

542-L. Design for Vitreous Enamelling. I. Styling of Enamelled Products. A. B. Kirkbride. **II. Production of Castings for Subsequent Vitreous Enamelling.** Wm. Todd. **III. Design and Production of Sheet-Metal Parts.** C. S. Beers. **IV. Enameller's Viewpoint of Design.** T. J. MacArthur. *Foundry Trade Journal*, v. 91, July 5, 1951, p. 17-24, 26. (L27)

543-L. Heat Resistant Aircraft Alloys Protected From Corrosion by Ceramic Coatings. *Industrial Heating*, v. 18, July 1951, p. 1269-1270, 1272.

Abstracts of two papers presented at the American Ceramic Society meeting: "Ceramic Coatings for the Prevention of Carbon Absorption in Four Heat Resistant Alloys," by Joseph W. Pitts and Dwight G. Moore; and "Effectiveness of Ceramic Coatings in Reducing the Corrosion of Five Heat Resistant Alloys by Lead Bromide Vapors," by Dwight G. Moore and Mary A. Mason. (L27, R general, AY)

544-L. Low-Cost Equipment Improves Electroplating. G. W. Jernstedt. *Iron Age*, v. 168, July 26, 1951, p. 73-75.

How techniques such as spray rinse, fog nozzles, diaphragms, air agitation, filtration, heat exchangers, and PR plating processes can be used to best advantage efficiently and economically. Opportunities for improvement of general electroplating practice are tabulated. (L17)

545-L. Hardfacing—Applications to the Iron and Steel Industries. P. L. Pocock. *Iron and Steel*, v. 24, July 1951, p. 323-326.

Materials and processes. "Stellite" is the principal material used for hard facing. The value of hard facing in its various applications. (L24, Co, SG-m)

546-L. High Temperatures; A Refractory Facing for Protecting Mild Steel. *Iron and Steel*, v. 24, July 1951, p. 336.

Describes a material called "Stoneclad," consisting of a borosilicate matrix containing insoluble refractories. This can be bonded to a metal surface to protect it during long periods of use at high temperatures. (L27, CN)

547-L. Finishing Supplement: Plating Hints. Thomas M. Rodgers. *Metal Industry*, v. 79, July 6, 1951, p. 6-7.

Various processes of cleaning metal before plating. (L17, L12)

548-L. Leveling Solutions. Adolph Bregman. *Metal Progress*, v. 60, July 1951, p. 56-60.

Brief summary of recommended methods in the use of leveling solutions. Factors affecting leveling with periodic reverse plating include PR cycle, current density, thickness of deposit, agitation, solution composition, addition agents and solution contamination. (L17)

549-L. Coating Problems in Metal Lithography. Part I. Charles R. Bragdon. *Modern Lithography*, v. 19, June 1951, p. 77, 79, 81; July 1951, p. 61, 63, 65.

The problem of decorating metal for cans and screw caps. The decorative film must withstand stretching and other distortions caused by the stamping process. Problems in thickness, composition, toxicity, color, taste, and flexibility of the coating. (L26)

550-L. Chromium Plating on Aluminium. *Machinery* (London), v. 79, July 5, 1951, p. 37.

New method whereby Cr can be plated directly onto the surface of Al. (L17, Al, Cr)

551-L. Tallow Can Replace Palm Oil in Hot Dip Tinning. G. C. Ference and W. R. Johnson. *Iron Age*, v. 168, Aug. 2, 1951, p. 86-89.

Mill tests indicate that modified prime beef tallow can be a satisfactory substitute for palm oil in hot-dip tinning. It is cheaper, doesn't have to be imported, and doesn't need dewatering, preheating, or dilution with used oil. (L16, CN, Sn)

552-L. Etched Pattern Identifies Lighter Tinplate Coat. John Kolb. *Iron Age*, v. 168, Aug. 2, 1951, p. 90-91.

Positive identification of the more lightly coated side of dual tinplate is made possible by an etched diamond pattern. This lightly etched marking results from acidified palm oil, applied at high speeds by a rubber roller. (L16, Sn)

553-L. Continuous Dip System Improves Tar Coating. F. R. Adams and G. E. Loftin. *Iron Age*, v. 168, Aug. 2, 1951, p. 92-94.

A continuous dipping system using a heated tar bath for cast-iron soil pipe and fittings which gives a coating superior to that produced where pipes are heated and then dipped. This bath is held at 300° F. and just enough residual heat for quick drying is retained. (L26, CI)

554-L. Corrosion and Scale Control. Edward N. Jones. *World Oil*, v. 133, Aug. 1951, p. 204, 208, 210.

The versatility of acids as well as correct application for removal of carbonate scale, cleaning well bores, and retrieving stuck liners. Case histories of wells successfully treated with scale-removing compounds are cited. (L12, ST)

555-L. Coatings for Underground Cables and Pipes. F. E. Kulman. *Paint and Varnish Production*, v. 41, Aug. 1951, p. 8-14, 32-33.

Coatings and coating practices on the underground cable and gas piping systems of the Consolidated Edison Co. of New York, Inc. and the conditions under which these coatings are installed and operating. Causes of cable corrosion. 11 ref. (L26, R8, Fe)

556-L. Electroformed Tooling. M. H. Orbaugh. *Automotive Industries*, v. 105, Aug. 1, 1951, p. 32-33, 86.

How electroformed tools are produced by electrodepositing Ni or Cu over the surface of a suitable matrix, usually cast phenolic, to an approximate thickness of $\frac{3}{8}$ in. Removing the deposited shell forms the mold cavity. (L18, Ni, Cu)

557-L. Alodizing Navy Cutless Fighters Against Corrosion. *Automotive Industries*, v. 105, Aug. 1, 1951, p. 38-39, 78.

Coating of Al parts with alodine against corrosion. (L14, Al)

558-L. Maintenance by Metallizing. Gilbert C. Close. *Finish*, v. 8, Aug. 1951, p. 23-26, 78-80.

Mechanics of the metallizing process. From the metallurgical standpoint, the spray metal does not fuse with the surface on which it is applied, but secures a bond by keying and hardening around minute surface irregularities. Various applications. (L23)

559-L. Phosphate Base Glasses as Enamels for Aluminum and Its Alloys. Part I. J. W. Donahey, G. J. Morris, and B. J. Sweo. *Finish*, v. 8, Aug. 1951, p. 31-34, 58-59.

Lead-free enamels for Al and its alloys were developed which display good adherence and excellent surface texture. These enamels can be formulated in a wide range of colors, and metal pretreatment is simplified. The enamel is workable with a wide range of alloys. They are essentially alkali alumina-borophosphate glasses, the ground coat containing as an essential constituent copper oxide. 16 ref. (L27, Al)

560-L. Silver Plating on Inconel. Leslie J. Cook. *Review of Scientific Instruments*, v. 22, July 1951, p. 542.

Concerns the plating of Ag, 0.0002 in. thick, onto Inconel tubing, $\frac{3}{8}$ in. in diam. The tubing is used as the center conductor of a coaxial cable. It was necessary for the Ag plating to have a conductivity of at least 90%. (L17, Ag, Ni)

561-L. Roller Coating Speeds Production. John E. Hyler. *Organic Finishing*, v. 12, July 1951, p. 15-16.

A process for painting metal and wooden strip. (L26)

562-L. New Uses for Cermetal Finishing. Robert B. Stanton. *Organic Finishing*, v. 12, July 1951, p. 17-19.

Applications and properties of cermetals. Production equipment. (L27)

563-L. Keeping Tractors in Service. Clyde B. Clason. *Welding Engineer*, v. 36, Aug. 1951, p. 26-29.
Reclamation of track rollers and idler wheels by automatic hard-facing. (L24, ST)

564-L. Liquid Blasting Cuts Die Polishing 10 Per Cent. *Western Machinery and Steel World*, v. 42, July 1951, p. 91.
At Rockford Drop Forge Co., metal surfaces are blasted with a high-velocity stream of nonmetallic abrasive particles suspended in an aqueous solution. (L10, TS)

565-L. Heat-Resistant Ceramic Coatings Broaden Low Carbon Steel Applications. *Steel*, v. 129, Aug. 13, 1951, p. 74-77, 96, 100.
Various types of ceramic coatings developed for use over a wide range of temperatures. Preparation of base metal. Thicknesses of coatings are 0.002-0.004 in. (L27, SS, CN)

566-L. Forgings Descaled 90 Per Cent Cheaper. *Steel*, v. 129, Aug. 13, 1951, p. 80-81.
A heated chemical bath which completely removes scale from steel forgings during quenching. Bath is made up of Pennsalt SR-4, dissolved in weak muriatic acid and water. (L12, J26, ST)

567-L. Maintaining Compressor Equipment. Frank H. Love. *Petroleum Engineer*, v. 23, July 1951, p. D19-D20, D22.
Metal spraying process applied to the reclaiming of piston rods in a compressor. (L23)

568-L. Materials of Construction for Pickling Operations Prior to Electroplating. E. A. Tice. *Plating*, v. 38, Aug. 1951, p. 826-830.
Corrosion resistant materials suitable for equipment employed in pickling and bright-dipping operations. 10 ref.
(L12, Fe, ST, Cu, Al, Zn)

569-L. Tentative Recommended Practice for Preparation of and Plating on Stainelss Steel. *Plating*, v. 38, Aug. 1951, p. 837-838, 843-845.
A procedure for the production of smooth, adherent electrodeposits on stainless steel. Cleaning methods and solutions, rinsing, plating, and stripping techniques. (L17, SS)

570-L. Cleaning and Preparation of Metals for Electroplating. III. Degreasing Evaluation Tests: The Atomizer Test. Henry B. Linford and Edward B. Saubestre. *Plating*, v. 38, Aug. 1951, p. 847-855.
Theory which underlies all wettability tests and a detailed analysis of the reasons for the greater sensitivity of the atomizer test than of waterbreak and spray-pattern tests. The general theory of wettability of metals was discussed only in so far as it concerns the tests being employed. 253 ref. (L12, L17)

571-L. Tin Plate. Alfred E. Kadell. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 324-339.
Production methods for tin plate described. Emphasis is on plating and pickling, but rolling and annealing are also considered.
(L16, L17, F23, Sn, ST)

572-L. What Finish For Aluminum? *Canadian Metals*, v. 14, July 1951, p. 42.
Briefly discussed.
(L general, Al)

573-L. A Modern Phosphating Plant in Great Britain. D. Brownlie. *Canadian Metals*, v. 14, July 1951, p. 45.
Briefly described. (L14, ST)

574-L. Light Metal Chromed Cylinders. *Engineer*, v. 192, July 27, 1951, p. 115-117.
Developments in the use of Al for engine components. Process of coating Al cylinders with porous chromium, so that a lubricant can be held in the pores, reducing cylinder wear. (L17, Al)

575-L. The Surface Treatment of Aluminium and Magnesium. V. F. Henley. *Light Metals*, v. 14, July 1951, p. 378-388.
Mechanically produced finishes, chemical surface treatment, and electrochemical finishes. Equipment and tabulated data.
(L10, L12, L13, Al, Mg)

576-L. Tube Galvanizing Plant. *Metal Industry*, v. 79, July 27, 1951, p. 65.
The Witton Kramer magnetic-roll equipment in use at Stewarts & Lloyds, Ltd. in Britain. (L16, ST)

577-L. The Mechanism of Electrolytic Metal-Polishing. (In French.) W. J. McG. Tegart and R. G. Vines. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 245-250.
It is theorized that the surrounding viscous layer, whose formation is influenced by diffusion, is a factor in producing, adjacent to the metal, an oxide film, which protects the surface and assures its uniform solution. The theory is also adequate to explain polishing effect for high current densities. Samples of Cu and Bi were used. 11 ref.
(L13, Cu, Bi)

578-L. Chemical Polishing of Aluminum and Its Alloys. (In French.) J. Herenguel and R. Second. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 262-266.
Various acid baths used in the process and results obtained.
(L12, Al)

579-L. Variation of Rate of Anodic Oxidation With Orientation of the Crystal Face. (In French.) Jean Herenguel and Pierre LeLong. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, June 11, 1951, p. 2218-2220.
Studied using an Al alloy.
(L19, M26, Al)

580-L. Electrodeposition of Tungsten. Thick Deposits of Tungsten Alloys. (In French.) *Métallurgie et la Construction Mécanique*, v. 83, Mar. 1951, p. 199-201.
Shows that continuous use of various methods described is inexpedient because effect of anode dissolution on composition of bath and on voltage cannot be avoided. Various baths are unsatisfactory because of excessive loss of NH_3 at higher temperature. 10 ref. (L17, W)

581-L. High Temperature Galvanizing. The Problem of Zinc Supply. (In French.) A. Gordet. *Métallurgie et la Construction Mécanique*, v. 83, Apr. 1951, p. 297-301; May 1951, p. 197, 199.
For best results Pb content of Zn should not be greater than 1%. Proposes method for maintaining satisfactory Pb content. A study of Al additions is under way.
(L16, Zn, ST)

582-L. Metal and Plastic Coating of Copper, Tin, and Zinc. (In French.) Francais Hedde. *Métallurgie et la Construction Mécanique*, v. 83, June 1951, p. 485-486.
Metallizing guns used in the process, and some of the applications.
(L23, Cu, Sn, Zn)

583-L. The Protal Process. (In French.) Léon Ades. *Revue de l'Aluminium*, v. 28, June 1951, p. 230-232.
The process is an exclusively chemical method designed for protecting light alloys against corrosion and providing a good surface for painting. Uses an aqueous solution of salts including F, Cr, and Ti which can be applied either by dipping or spraying. These salts form on surface of the metal a slightly porous and highly absorbing coat which, though thin, is adhesive. (L16, Al)

584-L. What Metal Should Be Used to Assure Successful Surface Treatment? (In French.) *Revue de l'Aluminium*, v. 28, June 1951, p. 239-242.
Presents tables which facilitate selection of grade of Al or Al alloys to use. Mechanical polishing, electrolytic or chemical polishing, anodization or bright anodic decoration, and Ni or Cr plating.
(L general, Al)

585-L. The Surface Treatment of Aluminum and Its Alloys. (In German and French.) B. Mauderli. *Aluminium Suisse*, May 1951, p. 98-105; July 1951, p. 125-135.
Various types of mechanical surface treatment and their effects on the properties of Al and its alloys, methods of degreasing and of pickling for purposes of cleaning, decorative effect, and protection against corrosion. (L10, L12, Al)

586-L. Metal-Sprayed Wood Patterns (In German.) R. Plümacher. *Giesserei*, v. 38, June 14, 1951, p. 281-282.
Procedure of spraying wood patterns with metal and its advantages. A photograph shows such a metal-sprayed pattern. (L23, E17)

587-L. Grain Size and Hardness of Nickel Deposits in Relation to Luster. (In German.) Harald J. Read and Rolf Weil. *Metalloberfläche*, sec. A, v. 5, July 1951, p. A97-A101.
Experiments indicate no definite correlation between luster and grain size or hardness. Includes electron micrographs, photomicrographs, tables, and graphs. (L17, M27, Q29, Ni)

588-L. High-Luster Nickel Plating. (In German.) Richard Springer. *Metalloberfläche*, sec. A, v. 5, July 1951, p. A101-A110.
Reviews the literature on methods. Advantages of process and properties of lustrous Ni deposits. 97 ref. (L17, Ni)

589-L. Cause and Elimination of Defects in Custom Electroplating. (In German.) Heinz W. Dettner. *Metalloberfläche*, sec. B, v. 3, July 1951, p. B97-B100.
Minimum standards and most frequent defects in articles Ni plated in small quantities. Various operations of good Ni-plating. (L17, Ni)

590-L. Combined Lustrous Tin-Nickel Plating. (In German.) N. Parkinson. *Metalloberfläche*, sec. B, v. 3, July 1951, p. B108.
Previously abstracted from *Metal Industry*. See item 402-L, 1951.
(L17, Ni, Sn)

M
METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

199-M. Recent Developments in Metallography. E. C. W. Perryman. *Metal Industry*, v. 79, July 13, 1951, p. 23-26.
A systematic account of the position and usefulness of new techniques in metallographic examination. Mechanical and electrolytic polishing methods. 11 ref.
(M21, Al, Cu, Zn, Mg, Cd, Sn, Pb, Ti)

200-M. Relation of Base Metal Surfaces to Plating Success. *Metal Progress*, v. 60, July 1951, p. 118, 122, 124, 130, 132, 134, 136, 138. (Condensed from "The Influence of Base Metal Surfaces on the Nature and Characteristics of Electrodeposited Metals," by A. T. Steer. Australian Institute of Metals, Physical Metallurgy Division, 1941, Symposium on Electrodeposited Metals.)

Crystal structure and metallography of base metal and influence on the electroplate. (M26, M27)

201-M. The Miscibility Gap in the Liquid Phase of the Lead-Silver-Zinc System. (In German.) Wolfgang Seither and Gertrud Helmold. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 137-141.

Shows that the region occupied by the two liquid phases investigated may be graphically represented in such a manner that the conodes fall on a plane perpendicular to the base and that the Cailletet-Mathias straight-line curve of the binary Pb-Zn system is projected as a plane in the ternary phase region. (M24, Zn, Pb, Mg)

202-M. Twenty-Five More Years of Metallography. J. R. Vilella. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 605-619.

An appraisal of achievements that have contributed to the progress of microscopical metallography during the past 25 years. Photomicrographs. 10 ref. (M21)

203-M. Intermetallic Compounds in the System Molybdenum-Beryllium. Samuel G. Gordon, James A. McGurty, Gilbert E. Klein, and Walter J. Koshuba. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 637-638.

A study of the solid-state reaction between metallic Mo and Be at elevated temperatures. Tables of the interplanar spacings of $MoBe_2$ and $MoBe_{12}$ are given. (M26, Mo, Be)

204-M. Thermal Stability of the Chromium, Iron, and Tungsten Borides in Streaming Ammonia and the Existence of a New Tungsten Nitride. R. Kiessling and Y. H. Liu. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 639-642.

The Cr, Fe, and W borides were treated with ammonia at different temperatures. They are attacked, forming metal nitride and boron nitride. Results are summarized in tables. In the W-N system a new phase was observed, closely related to the known β-phase. 11 ref. (M26, Cr, Fe, W)

205-M. Microstructural Instability of Steels for Elevated Temperature Service. G. V. Smith, W. B. Seens, H. S. Link, and P. R. Malenock. *American Society for Testing Materials,* Preprint 28, 1951, 18 pages.

Effect of exposure for 10,000 hr. (about 14 mo.) at 900, 1050, or 1200° F. on microstructure, hardness at room temperature, and notch-impact strength at different temperatures of 18 ferritic or austenitic steels which may be applied at elevated temperatures. (M17, Q6, Q29, AY, SS)

206-M. Report of Committee E-4 on Metallography. L. L. Wyman, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 440-492.

Previously abstracted from *American Society for Testing Materials,* Preprint 103, 1950. See item 213-M, 1950. (M21, ST)

207-M. Some Effects of Austenitic Grain Size and Metallurgical Structure of the Mechanical Properties of Steel. G. M. Sinclair and T. J. Dolan. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 587-616; disc., p. 617-618.

Previously abstracted from *American Society for Testing Materials,* Preprint 15, 1950. See item 209-M, 1950. (M27, Q general, ST)

208-M. A New Electrolytic Polishing Method for Metallographic Investigations of Si-Rich Light Alloys. E. Knuth-Winterfeldt. *Engineers' Digest,* v. 12, July 1951, p. 222. (Translated and condensed.)

Previously abstracted from *Revue de l'Aluminium.* See item 131-M, 1951. (M21, Al)

209-M. Microscopical Studies on the Iron-Nickel-Aluminium System. Part II. The Breakdown of the Body-Centred Cubic Lattice. A. J. Bradley. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 233-244.

Body-centered cubic alloys of the Fe-Ni-Al system may be classified as either β disordered or β ordered like NiAl. Contrary to the experience of earlier investigators, these alloys give rise to microsections which are readily recognized under oil immersion. Three main types of duplex alloy were identified. 18 ref. (M26, Fe, Ni, Al)

210-M. Chi Phase in Alloy Steels; Its Relationship to Sigma Phase. K. W. Andrews and P. E. Brooks. *Metal Treatment and Drop Forging,* v. 18, July 1951, p. 301-311.

Experimental observations, theoretical and structural aspects. Comparison of two phases. 24 ref. (M27, AY)

211-M. Phase Diagrams of the Ternary Systems Fe-Cr-W and Fe-Cr-Mo at Low Temperatures. H. J. Goldschmidt. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 249-257.

Investigated by X-ray analysis for a 600° C. equilibrium, using powder-diffusion methods. Behavior of the sigma and xi phases, which are largely competitive and tend to inhibit each other, and of the primary alpha solid solutions; the latter form miscibility bays with potential precipitation-hardening effect. Practical applications of the two alloy systems are pointed out. 27 ref. (M24, Fe, Cr, Mo)

212-M. The Constitution of the Chromium-Rich Alloys of Chromium and Beryllium. A. R. Edwards and S. T. M. Johnstone. *Aeronautical Research Laboratories,* Commonwealth of Australia, Report SM 161, Nov. 1950, 20 pages.

Constitution diagram of the Cr-rich alloys which has been found to consist of a eutectic between the α solid solution and an intermediate phase β based on $CrBe_2$. Theory of alloying and the development of heat resisting materials. (M24, Cr, Be)

213-M. Study of Lower Bainite With the Electron Microscope. (In French.) P. Coheur and L. Habraken. *Revue Universelle des Mines, de la Metallurgie des Travaux Publics, des Sciences et des Arts Appliqués a l'Industrie,* v. 94, Mar. 1951, p. 107-111.

Study of bainite needles shows that their structure is either lamellar or finely distributed. These substructures obey an orientation law, forming on the (111) planes of austenitic lattice structure. (M27, ST)

214-M. Electron Diffraction Study of the Surface Structure of Mechanically Polished Alloys. (In French.) N. Takahashi. *Métaux; Corrosion-Industries,* v. 26, May 1951, p. 189-197.

Face-centered alloys were studied by electron diffraction and two types of structure were discovered which depended on the rate at which polishing occurred. A variety of alloys were used as samples. 17 ref. (M22, AY)

215-M. The Influence of Impurities and of Recrystallization on Crystal Orientation in the Spinning and Drawing of Copper. (In French.) Paul Bastien and Jean Pokorny. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 26, June 25, 1951, p. 2447-2449.

A short discussion, including a graph. (M26, G13, G4, Cu)

216-M. Principles of the Experimental Study of Pseudo-Symmetrical Crystal-Lattices With the Aid of Debye-Scherrer Diagrams. Application to Some Solid Solutions. (In French.) René Faivre. *Revue de Métallurgie,* v. 48, June 1951, p. 447-461.

The above principles are discussed and applied to the study of the $Pb-O_3$ system and to martensite. 22 ref. (M26, Pb, ST)

217-M. Crystallochemical Research of the Mn-As, V-Sb, Ti-Sb Systems. (In German.) H. Nowotny, R. Funk, and J. Pesl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, No. 3, 1951, p. 513-525.

X-ray studies show the Mn_2As phase in the Mn-As system, the VSb_2 phase in the V-Sb system, and the Ti_5Sb phase in the Ti-Sb system. Crystal structures of these compounds. (M24, Mn, As, V, Sb, Ti)

218-M. Research on Transformations in the Platinum-Iron System. (In German.) Albrecht Kuhmann and Gotho Gräfin v. Rittberg. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 470-477.

Investigated by magnetic, electric, dilatometric, and X-ray methods. Result is a rather drastic modification of the old Fe-Pt constitution diagram. 12 ref. (M24, Fe, Pt)

219-M. The Nickel-Gallium System. (In German.) Erwin Hellner. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 480-484.

Thermal analyses and X-ray recordings were made to determine constitution diagrams, phase boundaries, and crystal structures of the Ni-Ga system. (M24, Ni, Cu)

220-M. The Structure of Electrolytic Alloy Deposits. III. Copper-Lead and Silver-Bismuth Alloys. (In German.) Ernst Raub and Annemarie Engel. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 485-491.

X-ray and metallographic studies were made and resistance and hardness measurements taken in order to study structure and properties of above alloys before and after annealing. Electrolytic alloys were compared with cast and recrystallized alloys. (M27, Cu, Pb, Ag, Bi)

221-M. The Sigma Phase in Alloys Containing Iron and Chromium. (In English.) C. Vollers. *Metalen,* v. 6, June 15, 1951, p. 199-206; June 30, 1951, p. 221-227.

When Fe-Cr alloys are heated to a high temperature, a brittle phase, the sigma phase, may be separated, which can have an unfavorable effect on properties of the material. This phenomenon also occurs in many stainless and heat resistant steels. Formation of sigma phase is promoted by the presence of such alloying elements as Mn, Si, Mo, Cb, and N. On the other hand, C and Zr prevent or delay sigma formation. Effects of Ni and Ti; properties of sigma phase; and susceptibility to formation of sigma phase of the various stainless and heat resistant steels. Etching methods and X-ray procedures. (M26, Fe, Cr, SS SG-h)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

191-N. Stranger Atoms in Precipitation Hardening. II. *Metal Industry,* v. 79, July 13, 1951, p. 27.

(Continued on Page 18 Following Special Section)

Metals Review

THE NEWS DIGEST MAGAZINE

Published by the American Society for Metals

Volume XXIV—No. 9 | Part 2—ADVANCE PROGRAM | September, 1951

World Metallurgical Congress

Study Tour Itineraries

Special Activities in New York and Washington

Special Activities in Detroit

National Metal Congress

Programs of American Society for Metals

American Welding Society

Institute of Metals Division, A.I.M.E.

Society for Non-Destructive Testing

National Metal Exposition

MICHIGAN

STATE

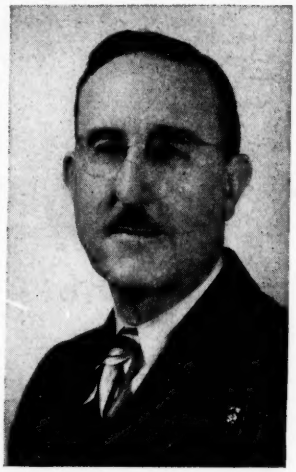
FAIR GROUNDS

Detroit, Mich.

Oct. 13-19, 1951

Your Invitation

TO DETROIT



WITH THE ADVENT of the first World Metallurgical Congress to be held concurrently with the National Metal Congress and Exposition in Detroit, members of the American Society for Metals and the cooperating societies are presented with a "once in a lifetime" opportunity. It is an opportunity to learn at first hand the status of metallurgical developments in all the free countries of the world. It is also an opportunity to welcome the top metallurgical scientists of the world and help them in our joint effort to defend world peace. That this convention will be truly worldwide in scope is indicated by registrations of more than 400 official conferees from 27 nations in every corner of the globe.

A statement which has appeared in the pages of Metal Progress encouraging attendance at Detroit fits my sentiments so well that I am reprinting it here in the hope that all the members of the A.S.M. and cooperating societies will accept the plans outlined and act accordingly.

"It has taken man endless centuries to reach the point where, for a common defense against a common enemy, he is willing to share with his neighbor the knowledge he has accumulated in the making and the development of weapons for defense.

"Now, for the first time in history, under the sole sponsorship of the American Society for Metals, free men from the free nations of the world will pool their resources . . . in arms, in manpower, in SCIENCE. What concerns the metal industry of America rests in the knowledge, the techniques and the conservation experiences that will be brought forth at the World Metallurgical Congress.

"Because hundreds of foreign metal scientists will be present and because a natural reticence might make them a bit shy of open discussion with American metal industry men, it'll take a lot of that easy, solid good fellowship Americans have to make our guest scientists feel at ease and feel at home. From these men Americans should learn much of production in times of critical shortages—for these men have worked and produced under severe handicaps and what they have accomplished should add measurably to our stock of knowledge."

Members who have attended the National Metal Congress in the past know the benefits that result from spending a week attending the technical sessions and educational meetings, exchanging their ideas privately with fellow workers from other sections of the country, and visiting the exposition. This year the program has been arranged to cover a variety of interesting subjects in metallurgy presented by leaders in their respective fields of endeavor. Knowing that the exposition will be the largest the Society has ever sponsored, we feel certain that, coupled with the important and practical sessions of the World Metallurgical Congress, it offers high promise of a convention program which is clearly broader in scope and deeper in interest than any we have ever presented. Plan now to join us!

Walter E. Jominy

President, American Society for Metals

NATIONAL METAL CONGRESS—NATIONAL METAL EXPOSITION

MICHIGAN STATE FAIRGROUNDS

Detroit, Michigan

METAL CONGRESS TAKES INTERNATIONAL SCOPE

METALLURGICAL science and engineering will come to the forefront of international thought and planning when the first World Metallurgical Congress convenes in the United States during the week of Oct. 13 to 19, 1951. Metals—basic to the economy as well as the defense of every nation—are critically short in supply in some localities and in variety in others. Every means must be taken to conserve supplies and utilize available material to the best advantage.

For this reason the World Metallurgical Congress to be sponsored by the American Society for Metals in conjunction with the National Metal Congress and Exposition is meeting with international approval and enthusiastic acceptance. The program for the event is broad and varied. It includes speeches, lectures, panel discussions, conferences, all generously larded with practical experiences, operations, and methods observed in the nation's leading industries, and topped with a concentrated operating display of metal-producing and metal-fabricating equipment at the 33rd annual National Metal Exposition.

Most important of all, however, is probably the opportunity afforded for face-to-face contact and personal acquaintanceship between men from such distances as Japan and Australia on the one side to Finland and India in the other direction.

The program of the World Metallurgical Congress will dovetail neatly into the myriad activities of the National Metal Congress and Exposition in Detroit the week of Oct. 13 to 19.

Some 500 metal experts from 27 countries with substantial metallurgical industries will participate in the event. These foreign "conferees" will be supplemented by an equal number of Americans and Canadians, each of these "opposite numbers" being carefully selected to represent a top scientific expert in the same line of activity as one of the foreign conferees.

The program of the Congress will include a number of special meetings, either of panel-discussion type or sessions for formal presentation of papers. Both American and foreign experts will serve as speakers and discussion leaders. In addition, all conferees will be welcomed to the meetings and lectures of the American Society for Metals and the other cooperating societies in the National Metal Congress. They will be allowed ample opportunity to visit the National Metal Exposition at the Michigan State Fair Grounds, which will be the largest, most diversified and most complete in its history.

An important feature preceding the Congress will be a series of plant study tours occupying a month's time prior to the opening of the National Metal Congress in Detroit. About 300 of the 500 foreign conferees will participate in eight separate plant visit itineraries, entirely planned and arranged by the American Society for Metals. Another hundred of the conferees will participate in three separate tour itineraries immediately following the close of the Metal Congress in Detroit; these latter three tours are under the management of the Metallurgical Research and Development Co., an international consulting organization with headquarters in Washington, D. C.

Thus there will be eleven groups in all, as follows:

***Group 1—Steelmaking and Refining.**
***Group 2—Nonferrous Refining, Rolling, and Fabrication.**
***Group 3—Ferrous Fabrication (Stamping Cold Work, Machining and Finishing).**
***Group 4—Heat Treatment.**
***Group 5—Welding and Joining.**
***Group 6—Testing and Inspection.**
†Group 7—Nonferrous Heavy Metal Fabrication.
***Group 8—Education (Engineering Societies and Universities).**
***Group 9—Research (Private Industry and Government Bureaus).**
Group 10—No group assigned this number.
†Group 11—Gavanizing Techniques.
†Group 12—Nonferrous Smelting and Refining.

* Tours sponsored by the American Society for Metals.
† Tours managed by Metallurgical Research and Development Co.

The Economic Cooperation Administration has extended substantial aid and encouragement in making these

A. S. M. Board of Trustees Lays Final Plans for World Metallurgical Congress at Its August Meeting

From left are Past President Arthur E. Focke; National Secretary W. H. Eisenman and Miss Evelyn Gardner, Mr. Eisenman's secretary, holding the banner; James B. Austin, trustee; Ralph L. Wilson, treasurer and vice-president-elect; Walter E. Jominy, president; and John Chipman, vice-president and president-elect. Seated are Thomas G. Digges, Elmer Gammeter and James T. MacKenzie, all trustees

tours possible. Foreign scientists traveling under Marshall Plan assistance will be expected to submit complete and detailed reports of all they see and learn to their respective governments. In this way a tremendous boost will be given to world production techniques and scientific know-how, and a new opportunity will be opened up for the free nations of the world to work together toward world peace.

During these industry tours, about 150 plants in 13 states and 57 cities will be visited. Complete itineraries of all tours are shown on pages 22A through 29A. The eight separate itineraries have been so planned that all of them will converge in Detroit well in advance of the National Metal Congress and Exposition.

During the week in Detroit separate meetings of the eight groups participating in the tours will be held. In these meetings the conferees will take part in free discussions of what they have observed, with opportunity for comparison to practices in foreign countries. The American "opposite numbers" of the conferees will also participate in these group discussion meetings.

The first formal meeting of the World Metallurgical Congress in Detroit will take place on Sunday evening, Oct. 14. On this all-important occasion a review of world metal resources will be presented by the best authorities and public officials that could be recruited from Europe and America. The meeting will be opened by Zay Jeffries, who is serving as director-general of the World Metallurgical Congress. Dr. Jeffries, a past president of A.S.M., is a retired vice-president of General Electric Co. and is currently serving on the Metallurgical Advisory Board in Washington, which guides the Federal Government on matters of metal shortages.

Other speakers at this keynote meeting (as shown in the tabulated program on page 14A) will be James Boyd, Administrator of Defense Minerals, Department of the Interior, K. P. Harten of Verein Deutscher Eisenhuttenleute (the German Iron and Steel Institute) and Clyde Williams, director of Battelle Memorial Institute in Columbus, Ohio.

Another high spot of the World Congress will be the farewell dinner on Friday evening, Oct. 19, which will be addressed by Charles E. Wilson, director of the Office of Defense Mobilization. He will speak on the strategic importance of world metal conservation and production to the national defense program.

Other W.M.C. sessions, at which 15 papers will be presented by foreign conferees will be worked into the regular technical sessions of the American Society for Metals. Altogether 47 papers were approved and accepted for presentation at the World Metallurgical Congress, but the crowded program in Detroit made it impossible to provide enough sessions for personal presentation of all of these fine papers. The criterion for selecting papers to be orally presented in Detroit was finally based upon subject matter which would best fit into the A.S.M. technical sessions which were already planned and scheduled. Selection was not made on the basis of merit, and many contributions of equally high quality and on diversified subjects will be found in the complete proceedings of the World Metallurgical Congress, to be published shortly after the close of the event.

Thus, many of the W.M.C. papers are intermixed on A.S.M. sessions with papers by A.S.M. members in this country. One exception is a complete new session on "Melting and Refining" which has been placed on the program for Monday morning, Oct. 15.

All possible steps have been taken to extend the hospitality and facilities of the nation to these high-ranking international visitors. A joint resolution has been introduced to the Congress of the United States providing for the recognition and endorsement of the World Metallurgical Congress. Dr. Oliver E. Buckley, Chairman of the Science Advisory Committee, Office of Defense Mobilization, will act as liaison officer between ODM and the W.M.C. Invaluable assistance in making arrangements has been extended by the State and Defense Departments, by Secretary of Commerce Charles Sawyer, and by Secretary of the Interior Oscar L. Chapman.

Conferees will be met at dockside or airport upon arrival in New York on or about Sept. 13. A welcoming luncheon will be held at the Waldorf-Astoria Hotel in New York, and another at the Mayflower Hotel in Washington, D. C.

Each traveling group will be accompanied by several tour escorts and a manager whose sole duties will be to handle arrangements for the group and assist them in any way possible to make their stay in America pleasant and profitable.

James Boyd *K. P. Harten* *Clyde Williams*

Three of the speakers at the Keynote Meeting on "World Metal Resources" Will be James Boyd, Administrator of Defense Minerals for the U. S. Government; K. P. Harten, secretary of the German Iron and Steel Institute; and Clyde Williams, director of Battelle Memorial Institute

Series of Receptions To Welcome Visitors

At all points along the way, from the time of arrival in New York on Sept. 13 until the climax is reached in Detroit on Oct. 19, foreign conferees to the World Metallurgical Congress will be treated to a series of hearty receptions and welcoming meetings.

The first of these will be a "Welcome to America" luncheon at the Waldorf-Astoria Hotel in New York on Sept. 17. Here they will be greeted by New York's Mayor Impellitteri, by Zay Jeffries, director-general of the World Metallurgical Congress; by Walter E. Jominy, president of the American Society for Metals; and by William H. Eisenman, secretary of the A.S.M.

At this luncheon a special "Welcome by Industry" will be tendered by such industrial leaders as Roy A. Hunt, chairman of the executive committee of the Aluminum Co. of America; Paul D. Merica, executive vice-president of the International Nickel Co. of Canada, Ltd., and R. E. Zimmerman, vice-president of United States Steel Co. Ex-President Herbert Hoover has also been invited to address the luncheon.

Present at the luncheon will be the group of past presidents of the American Society for Metals, each one acting as a host at one of the luncheon tables. Press representatives will be invited to this luncheon, as well as similar events in Washington and Detroit.

The second reception will be a "Welcome to the Nation's Capital", on Friday, Sept. 21, when all of the foreign conferees will assemble for luncheon at the Mayflower Hotel in Washington, D. C. Leaders of government, educational and scientific bodies will greet them and introduce them to the nation's governing center. On the following Saturday and Sunday, no formal arrangements have

been made, but instead the tour escorts and managers will provide sightseeing trips to points of interest.

The third event in the series will be a "Welcome to Cleveland", national headquarters for the American Society for Metals. Itineraries have been so arranged that most of the study tour groups will be in Cleveland on the weekend of Sept. 29 and 30. Visits to A.S.M. headquarters will be organized, and on Saturday, Sept. 29, the conferees will be invited to Sunnimoor Farm, summer home of William H. Eisenman, A.S.M. executive secretary. Here they will be treated to an "Early American Party". Formality will be dropped and fun will be the order of the day.

The "Welcome to Detroit" will take place on Sunday afternoon and evening, Oct. 13. Following a series of get-acquainted meetings with American conferees at 2:00 p.m., a civic reception will be extended to the visitors in the ballroom of the Statler Hotel at 4:00 p.m. Civic, industrial and religious bodies will be represented in the welcoming group.

On Sunday evening at 8:00 p.m. will be held the first general meeting of the World Metallurgical Congress with authoritative speakers on world metal resources. The conferees will be sped on their way back to their homeland at a final dinner on Friday, Oct. 19, to be addressed by Defense Mobilizer Charles E. Wilson.

House Passes Resolution Endorsing First World Metallurgical Congress

A Joint Resolution "providing for the recognition and endorsement of the World Metallurgical Congress" was introduced to the Congress of the United States and passed by the House of Representatives on August 20. According to this resolution, "The President is authorized and requested . . . to grant recognition to the World Metallurgical Congress and the American Society for Metals for its instigation and sponsorship of this first world gathering of metal scientists."

The resolution was introduced by Joseph W. Martin, Jr., Congressman from Massachusetts and minority leader. George H. Bender, Congressman-at-Large From Ohio, together with Congressman Frances P. Bolton, also of Ohio, gave it support and assistance. The text is as follows:

"Whereas a study of available metal resources and the conservation of these resources is of paramount concern to the harmony of free nations; and

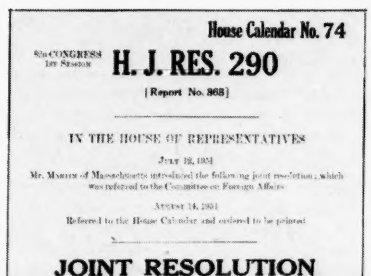
"Whereas the staffs of the United States Bureau of Mines and the Geological Survey have concluded a report declaring 'our mineral resources deficient in several important minerals and the outlook for major improvements not favorable,' and stressing our 'continued dependence on foreign resources for these commodities'; and

"Whereas the same report declared it 'obvious that a dynamic program of research and exploration must be pursued if new sources are to be developed to supply future needs'; and

"Whereas the exchange of metallurgical research ideas among top scientists of the free world will contribute to defense production in the United States and its friendly neighbors; and

"Whereas the efficient use of both new metal production and available scrap can enhance the security of the free peoples; and

"Whereas metallurgical art and science in the free world are in good



House Calendar No. 74

82d CONGRESS 1st Session

H. J. RES. 290

[Report No. 868]

IN THE HOUSE OF REPRESENTATIVES

JULY 12, 1951

Mr. MARTIN of Massachusetts introduced the following joint resolution; which was referred to the Committee on Foreign Affairs

AUGUST 14, 1951

Referred to the House Calendar and ordered to be printed

JOINT RESOLUTION

Providing for the recognition and endorsement of the World Metallurgical Congress.

Whereas a study of available metal resources and the conservation of these resources is of paramount concern to the harmony of free nations; and

health and the metallurgist can be counted on for the efficient utilization of the available resources; and

"Whereas it is particularly of interest to the United States now to demonstrate sincere friendly relations with all free world industrial production centers; and

"Whereas it has been a traditional American policy to utilize private inventive genius whenever possible, believing that it results in the advance of the general welfare; and

"Whereas the Economic Cooperation Administration already has given its endorsement and material help: Now, therefore, be it

"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Congress hereby extends its official welcome to the foreign metal scientists who will visit major American production centers and attend the World Metallurgical Congress, October 14 to 19, under sponsorship of the American Society for Metals. The President is authorized and requested, by proclamation, or in such manner as he may deem proper, to grant recognition to the World Metallurgical Congress and the American Society for Metals for its instigation and sponsorship of this first world gathering of metal scientists, calling upon officials and agencies of the Government to assist and cooperate with such Congress as occasion may warrant."

Special Meetings in Detroit Will Wind up Study Tours Of Traveling Scientists

A series of special meetings for the eleven study tour groups participating in the World Metallurgical Congress will be arranged for the week of the National Metal Congress in Detroit. Purpose of the meetings will be to provide an opportunity for foreign conferees to discuss with their American "opposite numbers" important aspects of each particular field of interest as gleaned during their tour itineraries and as reflected by their own experiences in their home industries.

Each of the eleven groups will have a chairman selected from the foreign conferees and a co-chairman of American conferees appointed by the A.S.M. Board of Trustees. These chairmen will be responsible for arranging the subjects for discussion and providing discussion leaders and speakers.

All of the meetings will be held on Monday and Tuesday mornings at the Tuller Hotel and Monday and Tuesday afternoons at the Fair Grounds. If it is found that an additional meeting is required by any of the groups, arrangements will be made for meeting rooms on Wednesday afternoon and Thursday morning and afternoon at the Fair Grounds. The scheduled meetings are as follows:

Monday, Oct. 15—9:30 a.m.

Group 2 on Nonferrous Refining, Rolling and Fabrication
Group 6 on Inspection and Testing
Group 8 on Education

Monday, Oct. 15—2:00 P.M.

Group 3 on Ferrous Fabrication
Group 4 on Heat Treatment
Group 11 on Galvanizing Techniques

Tuesday, Oct. 16—9:30 A.M.

Group 1 on Steelmaking and Refining
Group 5 on Welding and Joining
Group 9 on Metallurgical Education

Tuesday, Oct. 16—2:00 P.M.

Group 7 on Nonferrous Heavy Metal Fabrication
Group 12 on Nonferrous Smelting and Refining

Two general meetings for all study tour groups will be held on Friday morning and afternoon at the Fair Grounds. At these general meetings the chairmen of each of the groups will report the important aspects and conclusions of the studies made for the benefit of all the other groups.

Metal Show Housed in 7 Buildings, 6½ Acres

The 33rd National Metal Exposition, to be held in Detroit the week of Oct. 15, concurrently with the National Metal Congress and the first World Metallurgical Congress, will be unique in the long history of this annual event. It will be unique on several counts.

First, it is by far the largest metal exposition ever to be staged. It is large in size—large in number of exhibitors—large in scope. Estimations are that for the first time the number of exhibitors will exceed 400—the nation's industrial "400", representing the leading metal-producing, fabricating, and processing firms.

Second, it is housed in a new and different arrangement utilizing a number of separate buildings rather than one large hall. Grouped together at the Michigan State Fair Grounds are seven of these buildings devoted solely to exhibit space, and covering 6½ acres of floor space.

Third, it is unique in the international flavor imparted to it by the concurrent World Metallurgical Congress. Foreign exhibits will be there in a substantial number—from Great Britain, Germany, Sweden, Italy and France, including a display handled by the Technical Organization for the Utilization of Steel, representing the French steel industry.

Finally, it is unique in the service it will render to American industry during these critical days when every effort must be mustered to speed production, conserve critical materials, and devise ingenious substitutes to ease the shortages.

In the physical preparations for the Metal Show, no effort has been spared to accommodate the 45,000 expected visitors in making most efficient use of the hours they can spend at the Fair Grounds. In addition to the seven buildings utilized for exhibits, one entire building has been reserved for meeting rooms, another for a restaurant under the supervision of one of Detroit's best caterers, and a third for the ASM House of Friendship, headquarters for the foreign conferees to the World Metallurgical Congress.

A large and well-staffed information booth will be strategically located in front of building F, which occupies a central spot. Exhibit buildings will be interconnected by electrically lighted canopies to assist in the flow of traffic. Each building is identified by a single large letter prominently displayed so that it can be seen and located from any place on the Fair Grounds.

Additional lighting has been installed in many of the buildings, and a complete cleaning, renovating and redecorating well in advance of the opening will insure the pleasantest kind of surroundings for exhibitors and visitors alike.

As in years past, the Exposition will be open from 12:00 noon until 10:30 p.m. on Monday, Tuesday and Wednesday, Oct. 15, 16 and 17, and from 10:00 a.m. until 6:00 p.m. on Thursday and Friday, Oct. 18 and 19. Admission will be by membership card in one of the cooperating societies, by special invitation distributed by the exhibitors, or upon payment of a one-dollar registration fee.

Registration desks will be maintained both at the Fair Grounds and in the various headquarters hotels of the cooperating societies. A list of exhibitors, together with their booth numbers and brief notes concerning their principal products, begins on page 30A.

The Exposition is under the general direction and sponsorship of the American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio. William H. Eisenman is managing director of the National Metal Congress and Exposition, and Chester L. Wells is assistant managing director of the Exposition.

Entries Invited in 6th Metallographic Exhibit

The sixth Metallographic Exhibit of the American Society for Metals will be held at the National Metal Congress and Exposition in Detroit, during the week Oct. 15. A large area in one of the buildings at the Michigan State Fair Grounds, scene of the 1951 Metal Show, has been reserved so that entries can be displayed to best advantage.

Entries in the ASM Metallographic Exhibit have been invited on the basis of a dozen different subject classifications.

A committee of judges, appointed by the Metal Congress management, will award a first prize (blue ribbon) to the best entry in each classification. Honorable mentions will be awarded those closely approaching the winner in excellence.

A Grand Prize (engrossed certificate and $100 cash) will be presented to the exhibitor whose entry is judged "best in show". This grand prize entry becomes the property of the American Society for Metals for preservation and display in the Society's national headquarters.

Headquarters for Foreign Visitors

Special headquarters for the conferees to the World Metallurgical Congress will be maintained both at the Tuller Hotel and at the Michigan State Fair Grounds in Detroit during the National Metal Congress and Exposition.

Designated the ASM Hall of Friendship at the Tuller, and the ASM House of Friendship at the Fair Grounds, these special headquarters will provide meeting and conference facilities for all foreign and American conferees. On hand will be tour guides and escorts, A.S.M. national officers, past presidents and staff members to help in any way possible in providing contacts, information and assistance.

The A.S.M. House of Friendship at the Fair Grounds is an imposing separate building surrounded by an open porch with low railing and a covered veranda. It will be decorated with the flags of all nations represented in the gathering, and the interior rooms will have chairs and lounges for meetings and conferences as well as for relaxation.

Tea will be served each day at 4:00 p.m., with the wives of A.S.M. past presidents acting as hostesses under the leadership of Mrs. William H. Eisenman, wife of the A.S.M. executive secretary.

A.S.M. Program Will Include Papers by Foreign Conferees

Technical sessions international in scope will be presented by the American Society for Metals for its members and other visitors during the National Metal Congress and Exposition in Detroit Oct. 15 through 19. The program will include not only the technical papers regularly approved by the A.S.M. Publications Committee for printing in the *Transactions*, but also 15 of the 47 papers approved for the World Metallurgical Congress. Thus, the sessions will actually constitute a joint A.S.M.-W.M.C. program.

Other features will be the seminar on "Metal Interfaces" on Saturday and Sunday, Oct. 13 and 14, and two educational lecture courses on "Residual Stress Measurements" and "Principles of Heat Treatment". The complete A.S.M. technical program appears on pages 14A-16A.

The Society's annual banquet will be held in the ballroom of the Statler Hotel on Thursday, Oct. 18. Principal speaker will be Dr. J. O. Christianson, superintendent, School of Agriculture, University of Minnesota. The title of his talk will be "Rediscovering America".

J. O. Christianson

Dr. Christianson was selected as one of Minnesota's 100 Living Great in the centennial year of 1949. He has traveled extensively in Europe, and is thus particularly qualified to address this year's banquet, when many A.S.M. members from abroad will be present. Dr. Christianson has lectured to business groups, farm groups, educators and other professional organizations. He has conducted a regular radio program for more than ten years.

Other features of the banquet will be the presentation of the A.S.M. Gold Medal, the Medal for Advancement of Research, the Sauveur Memorial Award, and the Howe Medal. Recipients of these honors are announced in this issue. A.S.M. Retiring President Walter E. Jominy will preside at the banquet and present the awards.

The ballot for new officers of the society will be cast the preceding morning during the A.S.M. annual meeting. Up for president is John Chipman, head of the department of metallurgy, Massachusetts Institute of Technology. Ralph L. Wilson, director of metallurgy, Steel and Tube Division, Timken Roller Bearing Co., is on the slate for vice-president, and Ralph L. Dowdell, head of the department of metallurgy, University of Minnesota, for treasurer. Two new trustees have been nominated—namely, George A. Roberts, chief metallurgist, Vanadium-Alloys Steel Co., and J. B. Johnson, chief of materials division, Wright-Patterson Air Force Base.

The annual meeting on Wednesday morning will be followed immediately by the Campbell Memorial Lecture, to be presented by C. H. Lorig, assistant director, Battelle Memorial Institute, on "A Metallurgist Looks at Fracture."

Headquarters for the American Society for Metals will be at the Statler Hotel. Members who have not already registered by mail (see advance registration form on page 17) may register either at the Statler or at the Michigan State Fair Grounds, seat of the National Metal Exposition. A.S.M. technical sessions will be held at the Statler Hotel on Monday, Tuesday and Wednesday mornings, and in Building M at the Fair Grounds on Monday, Tuesday and Wednesday afternoons and evenings, on Thursday morning and afternoon, and on Friday morning. The Saturday and Sunday seminar sessions will be at the Statler, and both of the educational lecture courses in Building M at the Michigan State Fair Grounds.

The annual Chapter Chairman's Breakfast will be held in the Statler Hotel on Wednesday morning, and the Canadian Luncheon for members of the eight Canadian Chapters on Tuesday, Oct. 16, at the Tuller Hotel. Advance registrations for the annual banquet on Thursday should be mailed to the American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio. Tickets are $7.50 and tables will seat ten.

Special Libraries Assoc. Plans Regional Meeting

A regional meeting of the Metals Section, Special Libraries Association, Science-Technology Division, will be held during the last two days of the National Metal Congress in Detroit, Oct. 18 and 19. Papers dealing with literature problems of the metallurgist will be featured. Titles and speakers are shown in the program on page 17A.

A miniature functioning library will also be maintained by the Special Libraries Association in a booth at the National Metal Exposition. A metals librarian will be in continual attendance throughout the Congress.

The Michigan Chapter of Special Libraries Association is co-sponsoring the booth, and drawing generously upon its resources to help provide a small but functional library. It will contain books on metallurgy, magazine racks stocked with American and foreign technical publications pertaining to metals, and a card catalog of foreign work in metallurgy that has been translated into the English language.

Visiting metallurgists and their friends are cordially urged to avail themselves freely of this service.

Welding Society Has 21 Sessions, Varied Special Activities

A full week of technical activities has been scheduled by the American Welding Society for its 32nd annual meeting, held concurrently with the National Metal Congress and Exposition in Detroit, Oct. 15 through 19, 1951. The A.W.S. has scheduled 21 general technical sessions, two symposiums on timely welding problems, an educational lecture series, and an inspection trip to Ford Motor Co., in addition to the President's Reception, Adams Lecture, business meeting and annual dinner.

H. W. Pierce

Headquarters for the Society will be at Hotel Book-Cadillac, where all sessions will be held on the ballroom floor. The complete program is reproduced on pages 18A-19A.

Particularly timely is the symposium on the "Welding of Jet Engine Alloys", scheduled for Wednesday evening, Oct. 17, at 8:00 p.m. A. E. Lindsey of Ford Motor Co. and Walter Garman of General Electric Co. are co-chairmen of this meeting. Resistance and inert-arc welding, brazing, and flash-butt welding of high-temperature alloys will be considered in separate papers.

The second symposium, to be held on Thursday evening, will be on "Filler Metal Specifications for Inert-Gas and Submerged-Arc Welding". Inert-arc welding also comes in for special attention in the 1951 Adams Lecture on "The Welding of Copper by the Inert-Gas Metal-Arc Process". John J. Chyle of A. O. Smith Corp. will present the lecture at 8:00 p.m. on Tuesday, Oct. 16.

More than 70 papers are scheduled in the general technical sessions on such subjects as structural welding, resistance welding, weldability, hard facing and flame hardening, production welding, gas cutting, brazing, and welding of nonferrous metals, stainless steels and ship structures.

Harry W. Pierce, assistant to the president, New York Shipbuilding Corp., is president of the American Welding Society, and J. G. Macgrath is secretary with headquarters at 33 W. 39th St. New York 18.

A.I.M.E. Arranges Special Seminar On "Dislocations"

A seminar on "Dislocations in Metals" will constitute an important feature of the annual fall meeting of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, to be held in Detroit on the first three days of the Metal Congress week—namely Monday, Tuesday and Wednesday, Oct. 15, 16, and 17.

E. O. Kirkendall

In two meetings on Monday afternoon and evening, the subject of dislocations will be reviewed, brought up to date and clarified in a comprehensive manner. The seminar has been arranged by Morris Cohen, professor of physical metallurgy at Massachusetts Institute of Technology.

In addition, eight regular technical sessions will be held on such subjects as "Grain Growth and Recrystallization", "Alloy Systems", "Transformations", "Light Metals", "Creep", "High-Temperature Oxidation", and "Powder Metallurgy".

All of the meetings of the Institute of Metals Division will be held in the Detroit-Leland Hotel, which will be the Society's headquarters. Registration will be from 3:00 to 9:00 p.m. on Sunday, Oct. 14, from 8 a.m. to 9 p.m. on Monday, from 8 a.m. to 5 p.m. on Tuesday, and from 9 a.m. to 4 p.m. on Wednesday. Registration fee is $2.00 to A.I.M.E. members and $4.00 to nonmembers.

The annual Fall Dinner of the Institute will be held on Tuesday, Oct. 16. A cocktail party with the compliments of the Detroit members and their friends at 6:00 p.m. will precede the dinner at 7:00. Speaker and subject are yet to be announced. R. M. Brick, chairman of the Institute of Metals Division, will be toastmaster, and F. P. Bens, chairman of the Detroit section of A.I.M.E., will welcome the guests.

Ernest O. Kirkendall is secretary of the Institute of Metals Division, with headquarters at the American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York City.

S.N.D.T. Concentrates Attention on Jet Engine Inspection and Ordnance Testing

In view of the immense importance of inspection and testing operations to high production and material conservation in the metal industry, the Society for Non-Destructive Testing has lengthened its annual meeting from three to four days. One of the cooperating societies in the National Metal Congress and Exposition, the Society for Non-Destructive Testing will schedule its eleventh annual meeting for Oct. 15 through 18, Monday through Thursday, in Detroit.

The Society will have headquarters in the Detroiter Hotel, where all of its meetings will be held in the Flamingo Room. Eight complete sessions are planned.

Two important symposiums on practical inspection and testing operations will supplement the technical sessions, which will feature papers on some of the more theoretical and fundamental aspects of equipment and procedures. Both of these symposiums are scheduled for Wednesday, October 17.

The symposium in the afternoon is on "Jet Engine Parts Inspection". It will be conducted by a panel of several authorities in the field of jet engine manufacture. Emphasis will be placed on choice of methods applied in the processing of the part, the particular method used, and the evaluation of discontinuities which are found.

W. E. Thomas

The morning symposium on "Ordnance Material Testing" will be conducted by a panel of experts from the ordnance field. Discussion will include inspection problems in the manufacture of tanks, gun mounts, projectiles, and small arms. Emphasis will be placed on the methods of inspection used and the standards of acceptance.

The climax of the four-day meeting is the Lester Honor Lecture on Thursday afternoon, to be presented this year by Donald M. McCutcheon, research metallurgist for Ford Motor Company. His subject has not yet been announced. The annual business meeting will follow immediately after the Lester Lecture.

W. E. Thomas, vice-president in charge of sales and field engineering, Magnaflux Corporation, Chicago is President of the Society for Non-Destructive Testing. Phillip D. Johnson is secretary, and the national headquarters of the Society are at Evanston, Ill.

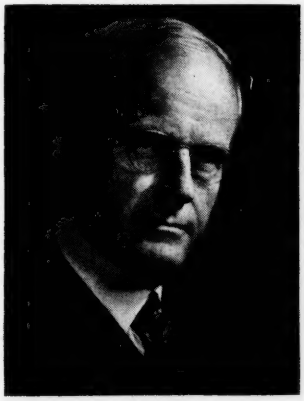
Laying the Groundwork

Zay Jeffries, Director-General of the World Metallurgical Congress, and A.S.M. National Secretary Eisenman Talk Over Plans for the Congress Shortly After Dr. Jeffries' Return From Europe Last Spring. Looking on from the wall are four successive A.S.M. past presidents —A. L. Boegehold, Francis B. Foley, Harold K. Work and A. E. Focke

Avoid Delay at the Registration Desk

See Page 17 for Advance Registration Coupon; your badge giving admittance to the National Metal Exposition will be mailed to you.

Merica, Mehl, Price, to Receive A.S.M. Awards



Paul D. Merica

Recipient of Gold Medal

One of A.S.M.'s top honors, its Gold Medal, will be presented to Paul D. Merica, executive vice-president, International Nickel Co., New York. Presentation will be made at the annual banquet of the Society, to be held in the grand ballroom of Detroit's Statler Hotel on Thursday evening, Oct. 18.

The Gold Medal was established in 1943 to recognize outstanding metallurgical knowledge and exceptional ability in the diagnosis and solution of diversified metallurgical problems.

Dr. Merica won fame early in his professional career by originating the precipitation hardening theory to account for the properties of the light, strong alloys of aluminum (duralumin) then newly developed. This work was done in conjunction with other scientists at the Bureau of Standards in Washington in the five years between 1913 and 1918. Before joining the staff of the newly organized division of metallurgy at the Bureau, Dr. Merica had studied at DePauw and University of Wisconsin, taught chemistry and physics in China, and won his doctor's degree at University of Berlin.

After World War I Dr. Merica joined the development and research department of the International Nickel Co., and has had a hand in the formulation of many iron-nickel and copper-nickel alloys. He has been a vice-president of International Nickel since 1936.

Sauveur Award

The Sauveur Achievement Award, established by the American Society for Metals in 1934, will be presented in 1951 to Robert F. Mehl, head, department of metallurgy, Carnegie Institute of Technology, Pittsburgh.

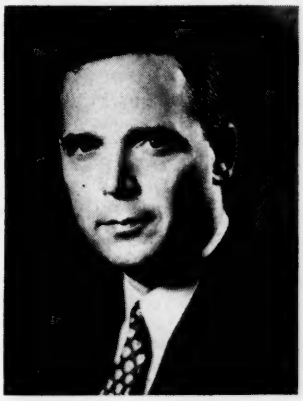
Dr. Mehl is currently dividing his time between Pittsburgh and Washington, where he is serving as chairman of the Metallurgical Advisory Board. The board was organized by the National Academy of Sciences, National Research Council, to advise the Research and Development Board, Department of Defense, on research matters.

The purpose of the Sauveur Award is to recognize pioneering metallurgical achievements which have stimulated organized work along similar lines to such an extent that a marked basic advance has been made in metallurgical knowledge. Dr. Mehl is the fifteenth to receive the award since it was first established and presented to Dr. Albert Sauveur, late Harvard professor, and widely known as the "dean of American metallurgists."

Dr. Mehl is one of the country's noted authorities on general and fundamental metallurgy and has contributed much to the development of special phases of the science, particularly in the fields of alloy constitution, crystal structure, diffusion and age hardening. Much of his early work was done as a National Research Fellow at Harvard University (1922-27), superintendent of the division of physical metallurgy, Naval Research Laboratory (1927-31), and assistant director of the research laboratories, American Rolling Mill Co. (1931-32). He has been at Carnegie Tech since 1932, where he is director of the Metals Research Laboratory as well as head of the department.

The 1951 Sauveur Award winner is a graduate of Franklin and Marshall College, with a Ph.D. from Princeton University and an honorary Sc.D. from Franklin and Marshall. He is the recipient of many honors and awards, including the Henry Marion Howe Medal of the A.S.M. for the best paper in the *Transaction* in 1939 and the Campbell Memorial Lectureship in 1941. He has been active on national committees of the A.S.M. as well as the A.I.M.E., whose Institute of Metals Division he served as chairman in 1938.

Robert F. Mehl, Recipient of the Sauveur Achievement Award for 1951, Holds a Plaque Reproducing a Portrait of Albert Sauveur, Which Was Presented to Him on the Occasion of the Sauveur Lecture Before the Boston Chapter Some Years Ago



G. A. Price

Recipient of Research Medal

A.S.M. Medal for the Advancement of Research

The 1951 A.S.M. Medal for the Advancement of Research will go to Gwilym A. Price, president, Westinghouse Electric Corp., in a ceremony at the annual banquet of the American Society for Metals in Detroit on Oct. 18.

Mr. Price ideally fills the qualifications upon which the Research Medal was founded in 1943. These are that "the candidate shall be an executive in an industrial organization, the principal activity of which is the production and fabrication of metals. He shall be one who, over a period of years, has consistently sponsored metallurgical research or development, and, by his foresight and influence in making available financial support, has helped substantially to advance the arts and sciences related to metals".

Mr. Price has been an executive with Westinghouse since 1943, and president of the corporation since 1946. His company, in 1950, made available a total of $50,000,000 in support of programs of research and engineering.

Mr. Price is a graduate of the University of Pittsburgh Law School with a long career as a banker (from trust officer to president of Peoples First National Bank and Trust Co. of Pittsburgh between 1923 and 1940). He is a director of many corporations and civic groups.

Each Study Group To Have American & Foreign Chairman

A roster of metallurgical "greats" in the United States has been selected to lead the meetings of the eleven tour groups of the World Metallurgical Congress in Detroit.

These men have been selected by the A.S.M. Board of Trustees to serve as chairmen of the American conferees in each of the eleven groups. Each group will also have a "chairman of foreign conferees" who will work with the American chairman in arranging the discussion meeting programs for the group.

Names of the American chairmen are as follows:

Group 1 on Steelmaking and Refining—Erle G. Hill, Metallurgist Wheeling Steel Corp., Wheeling, W. Va.

Group 2 on Nonferrous Refining, Rolling and Fabrication—Francis C. Frary, Research Director, Aluminum Company of America, New Kensington, Pa.

Group 3 on Ferrous Fabrication—E. H. Stilwill, Metallurgist, Chrysler Corp., Detroit.

Group 4 on Heat Treatment—Glen C. Riegel, Chief Metallurgist, Caterpillar Tractor Co., Peoria, Illinois.

Group 5 on Welding and Joining—Fred L. Plummer, Director of Engineering, Hammond Iron Works, Warren, Pa.

Group 6 on Testing and Inspection—W. E. Thomas, Vice-President in Charge of Sales, Magnaflux Corp., Chicago, Illinois.

Group 7 on Nonferrous Heavy Metal Fabrication—To be announced.

Group 8 on Research—Gilbert Doan, Head of Dept. of Metallurgy, Lehigh University, Bethlehem, Pa.

Group 9 on Education—Harold K. Work, Director of Research Division, College of Engineering, New York University, New York, N. Y.

Group 10—No subject designated.

Group 11 on Galvanizing Techniques—Gordon Johnson, Armour Research Foundation, Illinois Institute of Technology, Chicago.

Group 12 on Nonferrous Smelting and Refining—Carl E. Swartz, Chief of Metals Research, Armour Research Foundation, Illinois Inst. of Technology, Chicago.

Chairmen of the foreign conferees have not yet been selected, but will be known by the time the groups are organized in New York on Sept. 13.

It will be the responsibility of the group chairmen of the American conferees to arrange, in cooperation with the secretary of the A.S.M., for a meeting with the chairmen of the foreign groups soon after arrival in America. In these conferences they will determine subjects of prime interest that should be presented for discussion, and also such phases of the group's special interest as the visitors might be able to present to the American conferees.

All W.M.C. Conferees Will Receive Specially Designed Badges, Medallions

A specially designed bronze medallion drawn by a leading artist and molded by a noted sculptor, will accompany the identification badges of all conferees to the World Metallurgical Congress. The medal can be engraved with the conferee's name and will serve as a handsome memento of the event.

Likewise, each conferee will be provided with a looseleaf notebook carrying his name imprinted in gold. In addition he will be given a "Who's Who" booklet identifying all foreign conferees by name, company connection, and photograph.

The looseleaf portfolio will contain complete itineraries of all tour groups together with maps and other pertinent information concerning the cities to be visited. Included in the bundle will be a packet of airmail stationery together with a supply of calling cards printed with the individual's name and connection, and his identification as a conferee to the World Metallurgical Congress. These cards are designed to be helpful in identifying him with the acquaintances he makes in his trips about the country and at the National Metal Congress and Exposition in Detroit.

The WMC medallion was designed by Glenn M. Shaw, head of the department of commercial art at Cleveland Art School, an eminent medalist and muralist. The modeling was done by Walter A. Sinz, Cleveland sculptor and designer of the Gold Medal of the American Society for Metals. Medallic Art Co. of New York cut the dies and struck the medals.

As shown in the photograph, the three clasped hands are symbolic of the world-wide fraternity of scientists, while the ingot represents the metallurgical industry. The laurel wreath represents the peaceful objective of this combined international metallurgical event.

The medallions will be suspended from name bars by silk ribbons. A white ribbon will signify a conferee from a Marshall Plan country and a purple ribbon a foreign conferee traveling independently of ECA assistance. Canadians will have a red ribbon stamped with a gold maple leaf, and American conferees will use the traditional red, white and blue ribbon.

Conferees' Identification Badge With Commemorative Medallion

Conferees' Calling Card Will Be a Double Fold With the Top Engraved as Shown Above and the Individual's Name and His Company and Credentials Imprinted on the Inside

Special Luncheons Planned For Alumni, Other Groups

Special luncheons to be held during the week of the Metal Congress will include alumni luncheons of some 20 schools and colleges, the annual Canadian Luncheon of the American Society for Metals, and the Battelle Alumni Luncheon.

All college alumni luncheons will be held on Wednesday, Oct. 17, at the Statler and Tuller Hotels in Detroit. The Canadian and Battelle luncheons will be held at the Tuller Hotel on Tuesday, Oct. 16.

Reservations must be made by 6:00 p.m. of the day preceding the luncheons. They can be made and tickets purchased at the registration desks in the Hotels or at the Fair Grounds

Tour Escorts Will Be Technical Advisors To Foreign Visitors

To assist the various groups of foreign scientists and engineers who will be traveling about the country inspecting operations at American industrial plants as a preliminary to the World Metallurgical Congress in Detroit, a staff of tour managers and tour escorts has been engaged by the American Society for Metals, sponsor of the study tours and of the Congress.

The tour managers will be men with business experience who will handle transportation arrangements between cities and between hotels, plants, and railroad stations, take care of hotel reservations and other travel accommodations.

The tour escorts will act as technical advisors, each tour escort being responsible for about ten or twelve foreign visitors. These advisors will be with the foreign guests continuously from the time of their arrival in New York until after the close of the Congress in Detroit on Oct. 20. The tour escorts will accompany the groups when they are inspecting a plant, will sit in with them at the conference with management at the close of the tour, and will also sit in at meetings of the groups in their hotel when they compile the results of their experience at the end of the day.

The function of the tour escorts will be especially important during the week of the World Metallurgical Congress in Detroit. Here they will act as counsellors in helping the foreign conferees to arrange their program of activities; will help them select the functions they wish to attend, make desirable contacts, and show them how to get around the Exposition and to the meeting rooms.

Individuals have been selected as tour escorts who are well qualified and experienced in the particular phase of the metallurgical process that is being studied by the particular group. Names of the tour escorts are as follows:

Tour 1—Steelmaking and Refining

Bradley Stoughton, Professor of Metallurgy (retired), Lehigh University, Bethlehem, Pa.

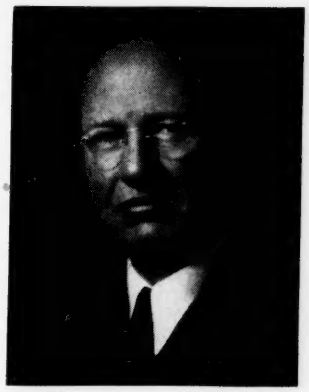
James O. Lord, Associate Professor of Metallurgy, Ohio State University, Columbus, Ohio.

Joseph Spretnak, Associate Professor of Metallurgy, Ohio State University, Columbus, Ohio.

Hugo Johnson, Battelle Memorial Institute, Columbus, Ohio.

J. L. Wyatt, Massachusetts Institute of Technology, Cambridge, Mass.

ODM Liaison



Oliver E. Buckley, Chairman of the Science Advisory Committee, Executive Office of Defense Mobilization, Is Serving as Liaison Officer Between the World Metallurgical Congress and ODM. He will be one of the guests of honor at the "Welcome to the Nation's Capital" luncheon in Washington for the foreign conferees

Tour 2—Nonferrous Refining, Rolling and Fabrication

Fred W. Fink, Battelle Memorial Institute, Columbus, Ohio.

David Bakalar, Massachusetts Institute of Technology, Cambridge, Mass.

Tour 3—Ferrous Fabrication

F. M. Klayer, Metallurgist, Tube Turns, Inc., Louisville, Ky.

Robert B. Schenck, Chief Metallurgical Engineer (retired), Buick Motor Div., General Motors Corp., Flint, Mich.

Tour 4—Heat Treatment

M. H. Medwedef, Consulting Metallurgist, Flint, Mich.

Russell Meussner, Carnegie Institute of Technology, Pittsburgh, Pa.

Tour 5—Welding and Joining

Laurence McD. Schetky, Rensselaer Polytechnic Institute, Troy, N. Y.

W. C. Truckenmiller, Assistant Professor, Dept. of Engineering Research, University of Michigan, Ann Arbor, Mich.

Tour 6—Inspection and Testing

F. H. Buttner, Massachusetts Institute of Technology.

Tour 8—Metallurgical Education

Otto Zmeskal, Director of Metallurgical Engineering, Illinois Institute of Technology, Chicago, Ill.

Lucio F. Mondalfo, Dept. of Metallurgy, Illinois Institute of Technology, Chicago, Ill.

Tour 9—Metallurgical Research

Thomas J. Hughel, Purdue University, Lafayette, Ind.

S. L. Hoyt, Technical Advisor, Battelle Memorial Institute, Columbus, Ohio.

Educational Courses Will Be on Heat Treatment And Residual Stresses

Two educational lecture courses—always a popular feature during the week of the National Metal Congress—will again be sponsored by the American Society for Metals in Detroit.

M. W. Baldwin

The first course, on "Residual Stress Measurements" will consist of four lectures presented in two sessions on Monday and Tuesday evening, Oct. 15 and 16. Wm. M. Baldwin, Jr., director of the metals research laboratory of Case Institute of Technology, is coordinator of the course, and each lecture will be presented by a different specialist. Titles and lecturers are listed in the program on p. 16A.

M. A. Grossmann

The second educational course on "Principles of Heat Treatment" will be presented by Marcus A. Grossmann, director of research, U. S. Steel Co. Dr. Grossmann's lectures will bring up to date his classic text on "Principles of Heat Treatment", first presented as a lecture course at the Metal Congress in 1935.

The heat treatment course will be presented in three sessions on Tuesday and Wednesday afternoons at 4:30 p.m. and Wednesday evening at 8:00 p.m.

All of the educational sessions will be held at the Fair Grounds, location of the National Metal Exposition. They will be open without charge to anyone attending the Congress and Exposition.

Karl L. Fetters, special metallurgical engineer, Youngstown Sheet & Tube Co., is chairman of the A.S.M. Educational Committee, which was in charge of planning and arranging these lecture courses.

AVOID DELAY AT THE REGISTRATION DESK

See page 17 for Metal Show Advance Registration Coupon

Seminar on "Interfaces" Will Probe Reactions in Metal Surfaces, Interiors

Probing the mysteries of some of the highly complex transformations and reactions that take place in metallic surfaces and interiors is the function of the A. S. M. "seminar" that traditionally opens the National Metal Congress technical program. Subject of this year's seminar in Detroit is "Metal Interfaces".

R. M. Brick

In 13 papers presented in four sessions, the theories behind reactions at metallic surfaces, internal boundaries, interfacial energies and interfacial movements will be thoroughly studied. The seminar sessions will be held on Saturday and Sunday morning and afternoon, Oct. 13 and 14, in the Statler Hotel.

The seminar has been arranged under the direction of Robert M. Brick, director of metallurgical engineering, Towne Scientific School, University of Pennsylvania, and includes papers by some of the top physical and theoretical metallurgists of the country. The complete program is given on page 14A. Chairman of the A.S.M. Seminar Committee is John H. Hollomon, research associate, General Electric Co.

Special Volume to Record Proceedings of W.M.C.

A bound volume containing complete proceedings of the World Metallurgical Congress and running close to 1000 pages will be published shortly after the close of the Congress.

The book will contain all of the 47 scientific papers approved for the Congress, together with the results of the eleven study tour group meetings, speeches, addresses of welcome, history of the activities, and names of American and foreign conferees. It will include the talks given by Zay Jeffries, K. P. Harten, and Clyde Williams at the opening session on World Metal Resources, and the address by Defense Mobilizer Charles E. Wilson at the final dinner meeting.

Original plans to reprint all of the scientific papers approved for the Congress had to be abandoned when it developed that the number of high-quality contributions far exceeded original anticipations. In the short interval of time available it was impossible to find a printer with adequate facilities to handle the work. However, all of the papers are now being set in type and it is anticipated that only a short delay will be involved before the volume is ready for distribution after the Congress adjourns.

The book will be made available at a special prepublication price to all members of the American Society for Metals and all conferees to the WMC. Order forms will be sent to ASM members in December.

A second publication — a "Who's Who at the World Metallurgical Congress"—will be issued in two editions. The first, containing the names, photographs and credentials of the conferees in the eight ASM-sponsored study tour groups will be presented to these visitors on their arrival in New York on Sept. 13. The second edition will contain the additional names of conferees attending only the Detroit sessions, together with the conferees who will participate in study tours following the Congress under the direction of the Metallurgical Research and Development Co. This edition will be available to the conferees with the opening of the sessions in Detroit on Oct. 13.

Augmented A.S.M. Staff Guides Intricate Arrangements for Visitors' Itineraries

Services of a group of top-notch industrial leaders and technical assistants have been secured to assist in the thousand-and-one details involved in the preparations for the World Metallurgical Congress. Augmenting the staff of the American Society for Metals and assisting Executive Secretary W. H. Eisenman in the direction of the Congress are a corps of technical and business heads recruited from various sections of the country.

Named early last fall as director-general of the Congress was Zay Jeffries, past A.S.M. president, retired vice-president of General Electric Co., and a member of the Metallurgical Advisory Board in Washington. Dr. Jeffries' trip to various European capitals in February and March of this year was largely instrumental in assuring the success of the Congress.

Assistant to the director - general is John W. Barnet, who has been working on plans for the W.M.C. since the idea was conceived two years ago by Mr. Eisenman. Mr. Barnet has worked long and intensively with foreign embassies in Washington, with ECA, the State Department, and Department of Commerce in laying the groundwork for the Congress, and following all arrangements through official channels. He is an A.S.M. member of 15 years standing, having been on the executive committees of the Chicago and Columbus Chapters. He now directs his own consulting organization, International Technical Services, in Washington, D. C.

Working closely with the staff in Cleveland has been Kingsley W. Given, professor of speech, Kansas State College, now on leave. Mr. Given is serving as executive assistant for the World Metallurgical Congress to Mr. Eisenman. Arrangements for the various study tours have been handled under his direction, including contacts with industrial plants, preparation of railroad itineraries, and hotel reservations. Mr. Given was formerly head of the General Electric Chemical Department Lecture Bureau.

J. W. Barnet *K. W. Given*

As director of study tours, Miles Heberer, recently director of broadcasting for the State of New York, is in charge of transportation, housing and special events for the 300 conferees who will arrive in New York on Sept. 13. Under his supervision will be 15 tour escorts and 8 tour managers, who will accompany the conferees during the plant tour itineraries.

Additional members of the staff of the World Metallurgical Congress are Joseph Matthew Stanley Morris, Thomas F. Fleming, and W. Stuart Lyman. All three of these men are engaged in making arrangements for visits to industrial plants and providing for accommodations in the various communities to be visited.

From 1947 to 1951 Mr. Morris was assistant chief, correspondence division, International Monetary Fund, and previous to that was chief of communications in the United Nations Relief and Rehabilitation Administration.

Both Mr. Fleming and Mr. Lyman are also engaged in liaison work with industrial plants. Both are qualified metallurgists and A.S.M. members, Mr. Fleming being on leave from National Screw and Mfg. Co. of Cleveland, where he is metallurgical engineer. Mr. Lyman came to his W.M.C. work from the University of California, where he was teaching assistant in physical metallurgy. He has studied in Zurich, Switzerland, and has been an officer in the Navy Intelligence Division in Europe following World War II.

Committee of Detroit Wives Prepares Program For Ladies' Entertainment

A varied program of entertainment has been arranged for the ladies who will be in Detroit during the week of the National Metal Congress. The program has been prepared by a committee of Detroit chapter members' wives, under the chairmanship of Mrs. Walter E. Jominy, wife of the A.S.M. national president, working closely with the Detroit Convention and Tourist Bureau.

The committee will arrange to have two or three hostesses on hand at the registration desk in the Statler Hotel on Monday morning, Oct. 15, to invite the ladies to be present at all functions. A small registration fee will be charged to cover a portion of the expenses involved. The program is as follows:

Monday, Oct. 15

1:00 p.m.—Sightseeing trip through Bloomfield Hills, Cranbrook Schools and other points of interest.

3:00 p.m.—Tea at the A.S.M. House of Friendship at the Michigan State Fair Grounds.

Tuesday, Oct. 16

12:30 p.m.—Luncheon at the Detroit Boat Club followed by card party or sightseeing tour of Belle Isle, including flower gardens and zoo.

Wednesday, Oct. 17

9:30 a.m.—Trip through Greenfield Village and Edison Institute.

1:00 p.m.—Luncheon at Dearborn Inn.

Thursday, Oct. 18

12:00 p.m.—Trip to Canada via the new Veterans Building, waterfront developments in Detroit, Ambassador Bridge and Tunnel.

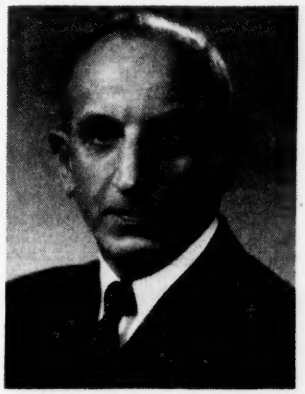
12:30 p.m.—Luncheon at the Prince Edward Hotel in Windsor followed by time allowed for shopping in Canada.

Industrial Gas Breakfast

The annual Industrial Gas Breakfast, sponsored by the Industrial and Commercial Gas Section of the American Gas Association, will be held on Friday morning, Oct. 19, at 8:30 a.m. in the Statler Hotel, Detroit, during the National Metal Congress. Following the breakfast there will be meetings of the Metals Committee and the Industrial Processing Committee.

The Gas Association will also sponsor a combined exhibit of industrial gas equipment, representing a group of manufacturers, and occupying a large section in Building G at the Fair Grounds.

Campbell Lecturer



"A Metallurgist Looks at Fracture" Is the Title Chosen by C. H. Lorig for the 1951 Campbell Memorial Lecture of the A.S.M. Dr. Lorig will present the Campbell Lecture in Detroit immediately following the annual meeting of the American Society for Metals on Wednesday morning, Oct. 17. Dr. Lorig is an assistant director at Battelle Memorial Institute, where he has been since 1930. He received his Ph.D. degree from University of Wisconsin in 1928. Last year he was awarded the Seaman Gold Medal of the A.F.A. for distinction in metallurgical research.

A.S.M. Local Chapters Will Entertain Visitors

A.S.M. local chapters in cities included on the various study tours of the World Metallurgical Congress are cooperating fully in arrangements for entertaining the visitors and inviting them to meetings and receptions.

The first event of this kind will occur on Monday, Sept. 17, when the New Jersey Chapter is holding its National Officers' Night, to be addressed by Walter E. Jominy, A.S.M. president, on the subject of "Hardenability". All conferees are scheduled to be in New York on that date, and will be conducted by special buses to Newark for cocktails, dinner, and the technical session.

Again in Washington on Friday, Sept. 21, all conferees are scheduled to be in the national capital and will be invited to the Washington Chapter's National Officers' Night at 8:00 p.m. in the Department of Commerce Auditorium. On this occasion they will hear John Chipman, A.S.M. president-elect, who will speak on "Steelmaking and Refining". A special reception and refreshments will be provided for the visitors at the close of the meeting at the Raleigh Hotel.

The third chapter event open to all W.M.C. conferees will be a meeting of the Detroit chapter on Oct. 8. One of the principal activities of the season, it will feature the annual William Park Woodside Lecture, to be delivered this year by F. P. Zimmerli, chief metallurgist of Barnes-Gibson-Raymond, on the subject of "Metallurgy of Mechanical Springs".

The Woodside lectureship was established by the Detroit Chapter in honor of "Billy" Woodside, one of the five founder members of the Society, who was responsible for the formation of the Detroit group that was one of the roots of the present A.S.M. The meeting will be held in the Rackham Memorial Building, an imposing structure and the home of all engineering societies in Detroit. Attendance at the dinner preceding the meeting is optional for the conferees.

Among other chapters that are making plans to entertain individual tour groups during their travels are Hartford, Cincinnati, Indianapolis, Peoria, and Southern Tier.

27 Nations Represented Plus U. S. and Canada

Twenty-seven free nations will be represented among the official conferees to the World Metallurgical Congress in Detroit, Oct. 13 through 19. This figure does not include the United States and Canada, who are acting as hosts. The other nations represented by the thousand or more conferees are as follows:

Argentina
Australia
Austria
Belgium
Brazil
Chile
China (Nationalist)
Denmark
Egypt
France
Germany
Great Britain
Greece
Holland
India
Italy
Japan
Luxembourg
New Zealand
Norway
Portugal
South Africa
Spain
Sweden
Switzerland
Turkey
Yugoslavia

To Hold Luncheon Meeting

The annual luncheon meeting of the Alloys of Iron Research of the Engineering Foundation will be held on Monday, Oct. 15 during the National Metal Congress. The luncheon will be at the Recess Club, Fisher Bldg., Grand Blvd. and Second St., Detroit, at 12:15 P. M.

Technical Program of

AMERICAN SOCIETY FOR METALS

and

WORLD METALLURGICAL CONGRESS

Statler Hotel and Fair Grounds, Detroit, Oct. 15-19, 1951

SEMINAR ON METAL INTERFACES

Saturday, Oct. 13

9:30 A. M.—Ballroom, Statler Hotel

Theoretical Considerations

Atomistic Theory of Metallic Surfaces, by Convers Herring, Bell Telephone Laboratories.

Theory of Internal Boundaries, by Harvey Brooks, Cruft Laboratory, Harvard University.

Grain Shapes and Other Metallurgical Applications of Topology, by Cyril Stanley Smith, Director of Institute for the Study of Metals, University of Chicago.

2:00 P. M.—Ballroom, Statler Hotel

Interfacial Energies

Measurement of Solid-Liquid and Solid-Gas Interfacial Energies, by Harry Udin, Department of Metallurgy, Massachusetts Institute of Technology.

Measurement of Solid-Solid Interfacial Energies, by James B. Hess, Kaiser Aluminum and Chemical Corp., Spokane, Wash.

Energies and Structure of Grain Boundaries, by Karl T. Aust, Kaiser Aluminum and Chemical Corp., and Bruce Chalmers, University of Toronto.

Sunday, Oct. 14

9:30 A. M.—Ballroom, Statler Hotel

Movements of Interfaces

Kinetics of Recrystallization, by David Harker, Director of Protein Structure Project, Brooklyn Polytechnic Institute.

Interfacial Movements During Recrystallization, by Paul A. Beck, Chairman, Department of Metallurgy, University of Notre Dame.

Interfacial Movements During Grain Growth, by Robert L. Fullman, Research Laboratory, General Electric Co.

Relative Interfacial Movements, by Arthur S. Nowick, Department of Metallurgy, Yale University.

2:00 P. M.—Wayne Room, Statler Hotel

Effects of Interfaces

Phase Transformations at Interfaces, by Alfred H. Geisler, Research Laboratory, General Electric Co.

Mechanical Property Effects of Interfaces, by Bruce Chalmers, Department of Metallurgical Engineers, University of Toronto.

Phenomena at Surfaces, by Herbert H. Uhlig, Department of Metallurgy, Massachusetts Institute of Technology.

WORLD METAL RESOURCES

Opening Session of World Metallurgical Congress

Sunday, Oct. 14—8:00 P. M.—Ballroom, Hotel Statler

Presiding: Zay Jeffries, Director-General, World Metallurgical Congress

Raw Materials for the Metal Industry, by James Boyd, Administrator of Defense Minerals, Department of the Interior, U.S.A.

Defense Metal Conservation and Substitution, by K. P. Harten, Executive Secretary of Vereins Deutscher Eisenhuttenleute (the German Iron and Steel Institute.)

Metals for Defense in the E.C.A. Countries. Speaker to be announced.

Metals for Defense in the Non-ECA Countries of the Free World, by Clyde Williams, Director, Battelle Memorial Institute, Columbus, Ohio.

A.S.M.—W.M.C. TECHNICAL SESSIONS

Monday, Oct. 15

9:30 A. M.—Ballroom, Statler Hotel

Constitution Diagrams

9:30—**Constitution and Properties of Cobalt-Iron-Vanadium Alloys,** by D. L. Martin and A. H. Geisler, General Electric Research Laboratories, Schenectady, N. Y.

10:00—**Phase Relationships in the Iron-Chromium-Vanadium System,** by Howard Martens, Research Engineer, and Pol Duwez, Associate Professor of Mechanical Engineering and Chief of Materials Section, Jet Propulsion Laboratory, California Institute of Technology, Pasadena.

10:30—**A Partial Titanium-Chromium Phase Diagram and the Crystal Structure of $TiCr_2$,** by Pol Duwez, Associate Professor of Mechanical Engineering and Chief of Materials Section, and Jack L. Taylor, Research Engineer, Jet Propulsion Laboratory, California Institute of Technology, Pasadena.

11:00—**The Titanium-Silicon System,** by M. Hansen, Supervisor, and H. D. Kessler and D. J. McPherson, Research Metallurgists, Nonferrous Metals Research, Armour Research Foundation, Chicago.

11:30—**The Indium-Antimony System,** by T. S. Liu, Teaching Fellow, and E. A. Peretti, Professor of Metallurgy, University of Notre Dame, Notre Dame, Ind.

Monday, Oct. 15 (cont.)

9:30 A. M.—Wayne Room, Statler Hotel

Melting and Refining

★9:30—**A Proposed Steelmaking Process,** by A. Reggiore, Vice-President, Societa Italiana Ernesto Breda, Milan, Italy.

★10:00—**A New Process for Direct Reduction of Iron Pyrites,** by A. Scortecci and M. Scortecci, Finsider Metallurgical Institute, Genoa, Italy.

★10:30—**A Rapid Analytical Method for Hydrogen in Steel,** by Y. Ishihara, Chief of Steelmaking Dept., and S. Sawa, Experimental Laboratory, Japan Special Steel Co., Tokyo, Japan.

★11:00—**Basic Bessemer Steel With Low Nitrogen and Phosphorus,** by P. Coheur, Director, Centre National de Recherches Metallurgiques, Liege, Belgium.

★11:30—**Phosphorus Deoxidation of Molten Copper,** by W. A. Baker, Research Manager, British Non-Ferrous Metals Research Association, London, England.

2:00 P. M.—Building M, Fair Grounds

Diffusion

2:00—**Interstitial Diffusion,** by A. G. Guy, Associate Professor of Mechanical Engineering, University of North Carolina, Raleigh, N. C.

2:30—**The Carbonitriding of Carbon and Alloy Steels,** by H. C. Fiedler, M. B. Bever and C. F. Floe, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge.

3:00—**Chromium Diffusivity in Alpha Cobalt-Chromium Solid Solutions,** by John W. Weeton, Research Metallurgist, Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics, Cleveland.

3:30—**Anisothermal Diffusion of Carbon in Austenite,** by J. E. Black, Captain, Ordnance Department, U. S. Army, Detroit Arsenal, and G. E. Doan, Professor and Head, Department of Metallurgical Engineering, Lehigh University, Bethlehem, Pa.

Tuesday, Oct. 16

9:30 A. M.—Ballroom, Statler Hotel

High-Temperature Phases

9:30—**The Formation of Sigma Phase in 13 to 16% Chromium Steels,** by H. S. Link and P. V. Marshall, U. S. Steel Co., Research & Development Laboratory, Pittsburgh.

10:00—**Electrolytic Etching—The Sigma Phase Steels,** by John J. Gilman, Crucible Steel Co. of America, Research Laboratory, Harrison, N. J.

★10:30—**Phase Changes Associated With Sigma Formation in 18-8-3-1 Chromium-Nickel-Molybdenum-Titanium Steel,** by K. W. Bowen and T. P. Hoar, Department of Metallurgy, University of Cambridge, England.

11:00—**Composition Limits of Sigma Formation in Nickel-Chromium Steels at 1200° F. (650° C.),** by M. E. Nicholson, Assistant Professor, Institute for the Study of Metals, University of Chicago, C. H. Samans, Associate Director, Materials Division, Standard Oil Co. (Indiana), Chicago, and F. J. Shortsleeve, Research Assistant, Case Institute of Technology, Cleveland.

11:30—**Ferrite Formation Associated With Carbide Precipitation in 18 Cr, 8 Ni Austenitic Stainless Steel,** by E. J. Dulis and G. V. Smith, Research Laboratory, U. S. Steel Co., Kearny, N. J.

9:30 A. M.—Wayne Room, Hotel Statler

Mechanical Metallurgy

9:30—**The Determination of Flow Stress From a Tensile Specimen,** by E. R. Marshall, Instructor of Metallurgy, and M. C. Shaw, Associate Professor of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge.

★10:00—**Plastic Deformation of Zinc Bicrystals,** by T. Kawada, Government Mechanical Laboratory, Ministry of International Trade and Industry, Tokyo, Japan.

★10:30—**The Mechanical Properties of Iron and Some Iron Alloys of High Purity,** by W. P. Rees, Senior Principal Scientific Officer, National Physical Laboratory, Middlesex, England.

★11:00—**Crystal Orientation in Cold-Rolled Silicon Steel Sheet,** by I. Gokyu, Assistant Professor of Physical Metallurgy, and H. Abe, Department of Metallurgy, Tokyo University, Japan.

11:30—**Delayed Yield in Annealed Steels of Very Low Carbon and Nitrogen Content,** by D. S. Wood, Assistant Professor, and D. S. Clark, Associate Professor, Department of Mechanical Engineering, California Institute of Technology, Pasadena.

2:00 P. M.—Building M, Fair Grounds

High-Temperature Alloys

2:00—**Cast Heat Resistant Alloys of the 21% Chromium, 9% Nickel Type,** by Howard S. Avery, Research Metallurgist, Charles R. Wilks, Metallurgist, and John A. Fellows, Research Metallurgist, American Brake Shoe Co., Mahwah, N. J.

2:30—**Influence of Extended Time on Creep and Rupture Strength of 16-25-6 Alloy,** by C. L. Clark and M. Fleischmann, Metallurgical Engineers, Steel & Tube Division, Timken Roller Bearing Co., Canton, Ohio, and J. W. Freeman, Research Engineer, Engineering Research Institute, University of Michigan, Ann Arbor.

3:00—**Isothermal Transformation, Hardening and Tempering of 12% Chromium Steel,** by R. L. Rickett, Research Laboratory, U. S. Steel Co., Kearny, N. J., W. F. White, and C. S. Walton, U. S. Steel Co., Pittsburgh, and J. C. Butler, South Works, U. S. Steel Co., South Chicago.

3:30—**Cladding of Molybdenum for Service in Air at Elevated Temperature,** by W. L. Bruckart, Research Engineer, and R. I. Jaffee, Supervisor in Nonferrous Physical Metallurgy, Battelle Memorial Institute, Columbus, Ohio.

Wednesday, Oct. 17

9:30 A. M.—Ballroom, Statler Hotel

A.S.M. Annual Meeting

Edward DeMille Campbell Memorial Lecture

A Metallurgist Looks at Fracture, by C. H. Lorig, Assistant Director, Battelle Memorial Institute.

2:00 P. M.—Building M, Fair Grounds

Embrittlement

2:00—**Effects of Decomposition of Retained Austenite During Tempering on Notch Toughness and Tensile Properties,** by E. F. Bailey and W. J. Harris, Jr., Ferrous Alloys Branch, Naval Research Laboratory, Washington, D. C.

2:30—**Comparison of the Effects of Alloying Elements on the Lower and Upper Transition Temperatures in Pearlitic Steel,** by J. A. Rinebolt and W. J. Harris, Jr., Ferrous Alloys Branch, Naval Research Laboratory, Washington, D. C.

3:00—**Effect of Retained Austenite Upon Mechanical Properties,** by L. S. Castleman, Atomic Power Div., Westinghouse Electric Corp., Pittsburgh, B. L. Averbach, Assistant Professor of Physical Metallurgy, and Morris Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology, Cambridge.

3:30—**Some X-Ray Diffraction and Electron-Microscope Observations on Temper-Brittle Steels,** by S. R. Maloof, Research Metallurgist, Springfield Armory, Springfield, Mass.

★World Metallurgical Congress papers submitted by foreign conferees.

Thursday, Oct. 18

9:30 A. M.—Ballroom, Statler Hotel

Mechanical Metallurgy

9:30—**Strain Aging Effects,** by J. D. Lubahn, Metallurgy and Ceramics Divisions, Research Laboratory, General Electric Co., Schenectady, N. Y.

10:00—**Fatigue Strength of Large, Notched Steel Bars Surface Hardened by Gas Heating and by Induction Heating,** by S. L. Case, J. M. Berry and H. J. Grover, Battelle Memorial Institute, Columbus, Ohio.

★10:30—**Deep Drawing Limits for Rectangular Boxes,** by T. Ishikawa, Managing Director, Nippon Aluminum Mfg. Co., Osaka, Japan.

★11:00—**Elimination of Yield Point Phenomena by Temper Rolling and Roller Leveling,** by N. H. Polakowski, University College, Swansea, England.

11:30—**Effect of High Heating Rate on Some Elevated-Temperature Tensile Properties of Metals,** by W. K. Smith, Metallurgist, C. C. Woolsey, Metallurgist, and W. O. Wetmore, Head, Metallurgy Branch, U. S. Naval Ordnance Test Station, China Lake, Calif.

9:30 A. M.—Wayne Room, Statler Hotel

High-Temperature Phases

★9:30—**An Interpretation of the Hysteresis Loops in A_2 and A_4 Transformations of Pure Iron,** by Kotaro Honda and Mizuho Sato, Honda Laboratory, Scientific Research Institute, Tokyo, Japan.

★10:00—**Magnetic Property Changes in Iron-Molybdenum Alloys During Aging,** by T. Mishima, Professor of Physical Metallurgy, R. Hasiziti, Assistant Professor of Physical Metallurgy, and Y. Kamura, Graduate Student, University of Tokyo, Tokyo, Japan.

★10:30—**Age Hardening,** by Y. Mishima, Tokyo, Japan.

11:00—**Carbide Reactions in High-Temperature Alloys,** by J. R. Lane, Naval Research Laboratory, Washington, D. C., and N. J. Grant, Associate Professor of Metallurgy, Massachusetts Institute of Technology, Cambridge.

★11:30—**The Allotropy of Cobalt,** by A. G. Metcalfe, Research Metallurgist, Deloro Smelting & Refining Co., Deloro, Ont., Canada.

2:00 P. M.—Building M, Fair Grounds

Heat Treatment

2:00—**Stress-Induced Transformation of Retained Austenite in Hardened Steel,** by B. L. Averbach, S. G. Lorris and Morris Cohen, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge.

2:30—**An Investigation of the Quenching Characteristics of a Salt Bath,** by M. J. Sinnott, Associate Professor of Chemical and Metallurgical Engineering, and J. C. Shyne, Graduate Student, Department of Metallurgical Engineering, University of Michigan, Ann Arbor.

3:00—**Limitations of the End-Quench Hardenability Test,** by A. R. Troiano, Professor of Physical Metallurgy, and L. J. Klinger, Senior Research Associate, Case Institute of Technology, Cleveland.

3:30—**A Correlation of End-Quenched Test Bars and Rounds in Terms of Hardness and Cooling Characteristics,** by E. W. Weinman, Research Metallurgist, R. W. Thomson, Assistant Head, and A. L. Boegehold, Head, Department of Metallurgy, General Motors Corp., Research Laboratories Division, Detroit.

Friday, Oct. 19

9:30 A. M.—Building M, Fair Grounds

Physical Metallurgy

9:30—**Particle Size Analysis of Metal Powders,** by C. C. Gregg and Bernard Kopelman, Sylvania Electric Products, Inc., Bayside, N. Y.

10:00—**Interrelation of Mechanical Properties, Casting Size, and Microstructure of Ductile Cast Iron,** by R. W. Kraft and R. A. Flinn, Metallurgy Department, American Brake Shoe Co., Mahwah, N. J.

10:30—**Gas Evolution from Gray Cast Iron During Enameling,** by L. F. Porter, Research Metallurgist, and P. C. Rosenthal, Professor of Metallurgy, Department of Mining and Metallurgy, University of Wisconsin, Madison.

11:00—**Aluminum, 6% Magnesium Wrought Alloys for Elevated-Temperature Service,** by K. Grube, Research Engineer, and L. W. Eastwood, Supervisor, Nonferrous Metallugy, Battelle Memorial Institute, Columbus, Ohio.

11:30—**A Study of the Microhardness of the Major Carbides in Some High Speed Steels,** by P. Leckie-Ewing, Metallurgist, Union Twist Drill Co., Butterfield Division, Rock Island, Que., Canada.

TWO LECTURE COURSES

All Sessions in Building M, Fair Grounds

Residual Stress Measurements

Monday, Oct. 15, 8:00 P.M.

Origin, Nature and Effects of Residual Stresses, by R. G. Treuting, Bell Telephone Laboratories, Murray Hill, N. J.

Measurements of Residual Stresses, by J. J. Lynch, Case Institute of Technology, Cleveland.

Tuesday, Oct. 16, 8:00 P.M.

Residual Stress States Produced in Metals by Various Processes, by H. B. Wishart, U. S. Steel Co., Gary, Ind.

Relief and Redistribution of Residual Stresses in Metals, By D. G. Richards, United Aircraft Corp., East Hartford, Conn.

Principles of Heat Treatment

All Lectures by M. A. Grossmann, Director of Research U. S. Steel Co., Pittsburgh

Tuesday, Oct. 16, 4:30 P.M.

1. Hardening. 2. Hardenability and Quenching.

Wednesday, Oct. 17, 4:30 P.M.

3. Isothermal Diagrams and Martensite. 4. Tempering.

Wednesday, Oct. 17, 8:00 P.M.

5. Grain Size. 6. Hardness, Strength and Toughness.

Additional Papers for WORLD METALLURGICAL CONGRESS

(To be published in the official Proceedings of the Congress. See also starred papers on A.S.M. technical program.)

Mineral and Metal Industries of India, by Dara P. Antia, British Aluminium Co., Ltd., New Delhi, India.

Some Factors Affecting the Wear of Bronze, by S. G. Daniel and R. Graham, Shell Refining and Marketing Co., Ltd., Thornton Research Centre, Chester, England.

The Influence of Different Surface Coatings on the Fatigue Strength of Steel, by Otto Forsman, Director, and Evert Lundin, Metallurgical Engineer, Government Testing Institute, Stockholm, Sweden.

Reducibility of Zinciferous Materials, by E. Frenay, Professor of Nonferrous Metallurgy, University of Liege, Belgium.

Deep Welding—a New Method of Oxy-Acetylene Welding, by R. Gunnert, Designing Department, Svenska Aktiebolaget Gasaccumulator, Stockholm, Sweden.

Short-Cycle Annealing of Whiteheart Malleable Castings, by P. F. Hancock, Chief Metallurgist, Birlec Ltd., Birmingham, England.

Improved Aluminum-Tin Alloys as Possible Bearing Materials, by H. K. Hardy, Head of the Physical Metallurgy Section, and E. A. G. Liddiard, Director of Research, Fulmer Research Institute, Buckinghamshire, England; J. Y. Higgs, Research Metallurgist, and J. W. Cuthbertson, Assistant Director of Research, Tin Research Institute, Greenford, Middlesex, England.

Metallic High-Temperature Resistance Alloys—a Comparison Between Fe-Cr-Al and Ni-Cr Alloys, by Gosta Hildebrand, Director of Research, Bultkoncernen, Hallstahammar, Sweden.

Cockerill Company's Experience With the Perrin Process, by J. Janvier, M. Nepper and J. Levaux, John Cockerill Societe Anonyme, Seraing, Belgium.

Bright Chromizing—the French Onera Process, by B. Jousset, President and Director-General, Societe Parisienne de Cementation, Paris, France.

Season Cracking of Manganese Brass Propellers, by Hoshio Kaneda, Hiroshima Shipyard and Engine Works, West Japan Heavy Industries, Ltd., Hiroshima, Japan.

Welding Austenitic Steels for High-Pressure Boiler Plants, by Egon Kauhausen, Chief Engineer of the Welding Rod and Electrode Factory and Chief Metallurgist of the Welding Laboratory, Bohler Brothers Edelstahlwerk, Dusseldorf, Germany.

Anti-Corrosive Treatments for Magnesium, by Tukasa Kawamura, Assistant Chief of Manufacturing, Nikko Copper Works, Furakawa Electric Co., Nikko, Japan.

Smelting Kuji Iron Sand by the Krupp-Renn Process, by Kenji Kuwada, Executive Director and General Manager, Fukiai Plant, Kawasaki Steel Corp., Kobe, Japan.

The Use of Combustion Models in Openhearth Furnace Studies, by A. H. Leckie, Head of the Steelmaking Division, British Iron and Steel Research Association.

Mechanical Properties of Spring Steel, by T. Mitsuhasi, M. Ueno, R. Nakagawa and K. Tsuya, Japan.

Operation of a Burner-Type Openhearth, by Iwao Murata, Muroran Works, Fuji Iron and Steel Co., Ltd.

Japanese Substitution Steels in the Last War, by Seiji Nishikiori, Managing Director and Chief Engineer, Shin-Daido Steel Mfg. Co., Ltd., Japan.

Welding of Toolsteels, by Tore Noren, Chief Metallurgist, Elektriska Svetsningsaktiebolaget, Goteborg, Sweden.

Recent Developments in the Metallurgy of Aluminum Piston Alloys With Hypereutectic Silicon Content, by Emma Maria Onitsch-Modl, Privatdozent, University of Leoben, Austria.

Flame Radiation, by G. M. Ribaud, Director of Study and Research on Gas, Faculty of Sciences, University of Paris; J. E. deGraaf, Head of Laboratories and Research, Royal Netherlands Iron and Steel Works, Ijmuiden, Holland; O. A. Saunders, Professor of Mechanical Engineering, Imperial College, University of London; and M. W. Thring, Head of Physics Department, British Iron and Steel Research Association, London, England.

Two Powder Metallurgical Methods to Prepare Alloy Specimens on a Laboratory Scale, by J. Schramm, Chief Research Metallurgist, Metall-Guss und Presswerk H. Diehl, Stuttgart, Germany.

The Commercial Development of Three German Wrought Zinc Alloys, by J. Schramm, Chief Research Metallurgist, Metall-Guss und Presswerk H. Diehl, Stuttgart, Germany.

The Effect of Small Aluminum Additions on Alloy Steel, by Mario Signora, Director of Research and Control Department Acciaierie e Ferriere Lombarde Falck, Milan, Italy.

The Cause of Check Marks on Copper Wire, by B. I. Strom, Research Engineer, and B. G. Waller, Assistant Superintendent of Wire Mills, AB Svenska Metallwerken, Vasteras, Sweden.

Experimental Production of Magnetic (Sendust) Powder Cores, by E. G. Thurlby, Superintending Metallurgist, Defense Research Laboratories, Melbourne, Australia.

Continuous Heat Treatment of Aluminum Alloy Strip, by Marcel Lamourdedieu, Director, Societe Centrale des Alliages Legers, Issoire, France

Effect of Hydrogen on the Flow and Fracture of Iron and Steel, by Paul Bastien, Technical Director, and Pierre Azou, Schneider & Co., Paris, France.

A Contribution to the Theory of the Deep Drawing Process for Sheet Steel, by E. M. H. Lips, Chief Engineer, Philips Gloeilampenfabrieken, and F. J. H. Rolink, Metallurgical Engineer, Van Doorne's Automobiel—en Aanhangwagenfabrieken, Eindhoven, Holland.

Metals Section Regional Meeting

SPECIAL LIBRARIES ASSOCIATION

Statler Hotel, Detroit, Oct. 18-19, 1951

Thursday, Oct. 18

10:00 A. M.—Statler Hotel

British Guides to Metallurgical Literature and Information, by B. Fullman, Chief Information Officer, British Non-Ferrous Metals Research Association.

The Literature on Corrosion, by I. M. Parker, Plantation Pipe Line Co., and Editor of *Corrosion.*

Experience With the ASM-SLA Punched Card Classification of Metallurgical Literature, by A. Wassenberg, Metallurgical Research Libraries, Kaiser Aluminum and Chemical Corp.

2:30 P. M.—Statler Hotel

Why Metal Companies Support Special Libraries, by W. M. Peirce, Assistant to General Manager, Technical Department, New Jersey Zinc Co.

Literature and Metallurgical Research, by C. M. Zapffe, Consulting Metallurgist.

How the Plant Metallurgist Uses the Literature. Speaker to be announced.

Friday, Oct. 19

9:30 A. M.—Statler Hotel

Problems of the Small Metals Library. Discussion Group. **Questions and Answers.** Jean Wesner presiding. (Problems submitted to the question box in the Metals Section booth will be answered by a panel of Metals Section librarians.)

2:00 P. M.—Statler Hotel

Problems of the Small Metals Library. Discussion Group continued from morning session if interest warrants.

Plant Visits

(Arranged by Michigan Chapter of S.L.A. and the Detroit Committee)

Plymouth Division Assembly line of the Chrysler Corp.
Research Library of General Motors Corp.

32nd Annual Meeting

AMERICAN WELDING SOCIETY

Book-Cadillac Hotel, Detroit, Oct. 15-19, 1951

Monday, Oct. 15

9:30 A. M.—Crystal Ballroom, Book-Cadillac Hotel

Structural Welding

Yield Strength of Welded Continuous Beams, by C. H. Yang and L. S. Beedle, Fritz Engineering Laboratory, Lehigh University, and H. G. Johnston, University of Michigan.

Column Strength Under Combined Bending and Thrust, by R. L. Ketter and L. S. Beedle, Fritz Engineering Laboratory, Lehigh University, and B. G. Johnston, University of Michigan.

Estimating Weldments and Welded Structural Steel, by Chas. F. Frantz, Lehigh Structural Steel Co.

Surface Conditioning of Structural Steel by Welding, by R. E. Somers and H. C. VonBlohn, Bethlehem Steel Co.

9:30 A. M.—Italian Garden, Book-Cadillac Hotel

Resistance Welding

Physical and Metallurgical Characteristics of Spot Welding Titanium, by M. L. Begeman, J. C. Fontana and Frank W. McBee, Jr., University of Texas.

The Application of Spot and Seam Welding to Design, by S. P. Jenkins and Thomas E. Piper, Northrop Aircraft, Inc.

Spot and Projection Welding Using Magnetic Electrode Force, by William E. Klingeman and H. H. Kruer, Precision Welder and Machine Co.

A Case of Power, by Myron Zucker, Myron Zucker Engineering Co., Jerry Geralds, Midwest Wire Products Co., and Paul Duker, Detroit Edison Co.

2:00 P. M.—Italian Garden, Book-Cadillac Hotel

Resistance Welding

Seam Welding Containers Automatically, by C. S. Seltzer, Swift Electric Welder Co.

Spot and Seam Welding of Nimonic and Similar Heat Resistant Alloys, by J. Solomon, Sciaky Bros., Inc.

Temperature Distribution During the Flash Welding of Steel, by Ernest F. Nippes, W. F. Savage and J. J. McCarthy, Rensselaer Polytechnic Institute.

2:00 P. M.—Grand Ballroom, Book-Cadillac Hotel

Weldability

Microcracks and the Low-Temperature Cooling Rate Embrittlement of Arc Welds in Mild Steel, by A. E. Flanigan, Department of Engineering, University of California.

Effect of Subcritical Cooling Rate on Strain and Quench Aging of Structural Steels, by C. Felmley, C. Hartbower and W. S. Pellini, Metallurgy Div., Naval Research Laboratory.

2:00 P. M.—Crystal Ballroom, Book-Cadillac Hotel

Nonferrous

Tensile Tests and Metallurgical Studies of Welded Copper Joints, by R. J. Mosborg, R. W. Bohl, F. L. Howland and W. H. Munse, Department of Civil Engineering, University of Illinois.

Welding Iron-Bearing Alpha Aluminum Bronze, by F. Emergy Garriott, Weldrod Department, Ampco Metal, Inc.

Pressure Welding Aluminum at Various Temperatures, by M. A. Miller and G. W. Oyler, Aluminum Research Laboratories, Aluminum Co. of America.

6:00 P. M.—Grand Ballroom, Book-Cadillac Hotel

President's Reception

Tuesday, Oct. 16

9:30 A. M.—Crystal Ballroom, Book-Cadillac Hotel

Ship Structure

Work of the Ship Structure Committee, by Rear Admiral K. K. Cowart, U. S. Coast Guard.

Low-Carbon Steel: Subcritical Heating vs. Transition Temperatures, by L. J. Klinger, E. B. Evaneskes and Wm. M. Baldwin, Case Institute of Technology.

Studies of Tests for Evaluating Welded Ship Steels, by C. B. Voldrich and P. J. Rieppel, Battelle Memorial Institute.

Stress Studies of Bulkhead Intersections for Welded Tankers, by W. R. Campbell, L. K. Irwin and R. C. Duncan, National Bureau of Standards.

The Influence of Composition and Steelmaking Practice Upon Ship Plate Quality, by H. M. Banta, Battelle Memorial Institute.

9:30 A. M.—Italian Garden, Book-Cadillac Hotel

Fundamental Studies of Arc Welding

The Effect of Power Supply Characteristics on D.C. Welding, by Jack B. Keyte, Department of Welding Engineering, Ohio State University.

Welding Characteristics of Submerged Arc With Three-Phase Power, by E. A. Clapp, Union Carbide and Carbon Research Laboratories, Inc., and Norman G. Schreiner, Linde Air Products Co.

Tools for Predetermining Preheat and Interpass Temperatures for Submerged Arc Welds, by Clarence E. Jackson and Arthur F. Shrubsall, Union Carbide and Carbon Research Laboratories, Inc.

Tuesday Morning

Inspection Trip to Ford Motor Co.

2:00 P. M.—Crystal Ballroom, Book-Cadillac Hotel

Ship Structure

Welded Reinforcement of Openings in Structural Steel Plates, by D. Vasarhelyi and R. A. Hechtman, University of Washington.

Evaluation of Welding Procedure by Direct Explosion Testing, by G. S. Mikhalapov, Metallurgical Research and Development Co.

Investigation of Factors Which Determine Welded Performance, by C. Hartbower and W. S. Pellini, Naval Research Laboratory.

Upper and Lower Transition in Charpy Tests, by W. J. Harris, Jr., J. A. Rinebolt and R. Raring, Naval Research Laboratory.

2:00 P. M.—Grand Ballroom, Book-Cadillac Hotel

Hard Facing and Flame Hardening

Control of Rail-End Hardening, by La Motte Grover, Air Reduction Sales Co.

Hard Facing for Impact, by Howard S. Avery, American Brake Shoe Co.

Development of Fused Metallized Coatings, by Harrison S. Sayre, U. S. Naval Engineering Experiment Station.

2:00 P. M.—Italian Garden, Book-Cadillac Hotel

Resistance Welding

Trends in Electronic Nonsynchronous Resistance Welding Controls, by Stuart C. Rockafellow, Robatron Corp.

Flash Welding of Components for Aircraft and Similar Applications, by J. H. Cooper, Taylor-Winfield Corp.

Fatigue Strength of Spot Welded Light Alloy Joints, by H. Kihara, President, Japan Welding Society.

4:30 P. M.—Italian Garden, Book-Cadillac Hotel

Educational Lecture Series

Lecturer: W. R. Plummer, Progressive Welder Co.

8:00 P. M.—Crystal Ballroom, Book-Cadillac Hotel

Adams Lecture

The Welding of Copper by the Inert-Gas Metal-Arc Process, by John J. Chyle, A. O. Smith Corp.

Wednesday, Oct. 17

9:30 A. M.—Crystal Ballroom, Book-Cadillac Hotel

Production Welding

Welding Heat Exchanger for the Chemical Industry, by John W. Mortimer, Professional Engineer.

Product Design for Welding, by John Mikulak, Worthington Pump and Machinery Corp.

Welding Fixtures for Use With Submerged Arc, by J. P. Berkeley, Berkeley Equipment Co.

9:30 A. M.—Grand Ballroom, Book-Cadillac Hotel

Pressure Vessels

Effect of Plate Edge Preparation on Notch Toughness, by S. S. Tor, E. I. du Pont de Nemours & Co., J. M. Ruzek, and R. Stout, Fritz Engineering Laboratory, Lehigh University.

Biaxial Fatigue Tests on Flat Plate Specimens, by R. U. Blaser, L. F. Kooistra and J. T. Tucker, Jr., Babcock & Wilcox Co.

Stresses in Cylindrical Pressure Vessels on Two Saddle Supports, by Leonard P. Zick, Chicago Bridge and Iron Co.

9:30 A. M.—Italian Garden, Book-Cadillac Hotel

Gas Cutting

Oxygen Cutting of Defense Equipment Materials, by A. H. Yoch, Air Reduction Sales Co.

Heavy Scrap Cutting in the Steel Mill, by L. P. Elly, Bethlehem Steel Co.

Powder-Washing for Metal Removal, by R. S. Babcock, Linde Air Products Co.

2:00 P. M.—Grand Ballroom, Book-Cadillac Hotel

Weldability

The Relation of Notch Strains to Bend Angles in the Notched-Bend Test, by A. E. Flanigan, University of California, and Ernest M. Emery, North American Aviation Co.

Repeated Load Tests on Welded and Prestrained Steel, by S. S. Tor, E. I. du Pont de Nemours & Co., J. M. Ruzek, and R. D. Stout, Fritz Engineering Laboratory, Lehigh University.

The Micro-Mechanism of Fracture in the Tension-Impact Test, by W. H. Bruckner, University of Illinois.

2:00 P. M.—Crystal Ballroom, Book-Cadillac Hotel

Welding and Brazing

Nested Electrodes for Metal-Arc Welding, by W. A. Snyder, University of Washington.

Welding in Steel Mill Maintenance During Defense Period, by R. L. Deily, Air Reduction Sales Co.

Dilution and Diffusion Aspects of Brazing, by R. D. Wasserman and Joseph F. Quaas, Eutectic Welding Alloys Corp.

2:00 P. M.—Italian Garden, Book-Cadillac Hotel

Stainless Steels

Welding of High-Alloy Steel Castings, by R. D. Thomas, Jr., Chairman of WRC Committee on the subject.

Welded Joints Between Dissimilar Metals for High Temperature, by R. W. Emerson, Pittsburgh Piping & Equipment Co.

Nitric Acid Corrosion Data of Welded Stainless Steels, by M. A. Scheil and H. F. Ebling, A. O. Smith Corp.

4:30 P. M.—Italian Garden, Book-Cadillac Hotel

Educational Lecture Series

Lecturer: W. R. Plummer, Progressive Welder Co.

7:30 P. M.—Founders Room, Book-Cadillac Hotel

University Research Conference

8:00 P. M.—Crystal Ballroom, Book-Cadillac Hotel

Symposium on Welding of Jet Engine Alloys

Resistance and Inert-Arc Welding of Jet Engine Alloys, by A. J. Rosenberg, General Electric Co.

Brazing Jet Engine Alloys for High-Temperature Service, by R. L. Peaslee, Wall Colmonoy Corp.

Flash Butt Welding of High-Temperature Alloys, by I. O. Oehler, American Welding and Mfg. Co.

Thursday, Oct. 17

9:30 A. M.—Crystal Ballroom, Book-Cadillac Hotel

Educational

Selecting and Training Welding Operators for the Defense Program, by A. N. Kugler, Air Reduction Sales Co.

Metallurgy for the Welding Student, by J. D. Paterson, Cass Technical High School.

Tentative Standards for School Welding Shops, by Carl H. Turnquist, Cass Technical High School.

Welding Instruction in the Public Schools, by A. D. Althouse, Detroit Public Schools.

9:30 A. M.—Italian Garden, Book-Cadillac Hotel

Weldability

The Arc Welding of Carbon-Molybdenum Steel Pipes, by F. J. Winsor, E. I. du Pont de Nemours and Co.

Residual Stresses Due to Circumferential Welds in Seamless Mild Steel Pipe, by L. J. Privoznik, Standard Oil Co. (Ind.).

Heat Treating Properties of Low-Hydrogen Electrode Weld Metal, by D. C. Smith and W. G. Rinehart, Harnischfeger Corp.

High-Temperature Welded Joints, by R. H. English, National Alloy Steel Co.

9:30 A. M.—Grand Ballroom, Book-Cadillac Hotel

Inert-Arc Welding

Inert-Gas Shielded Metal-Arc Welding of Magnesium, by Paul Klain, Dow Chemical Co.

Aircomatic Welding of Ferrous Metals, by E. DiLiberti, Air Reduction Co.

Metal Transfer in Sigma Welding, by R. T. Breymeier, Union Carbide and Carbon Research Laboratories Inc.

High-Speed Consumable Electrode Machine Welding for Aircraft, by Bernard Gross and R. A. Smith, Rohr Aircraft Corp.

2:00 P. M.—Crystal Ballroom, Book-Cadillac Hotel

Symposium on Filler Metal Specifications for Inert-Gas and Submerged-Arc Welding

2:00 P. M.—Italian Garden, Book-Cadillac Hotel

Business Meeting
Board of Directors Meeting

7:30 P. M.—Grand Ballroom, Book-Cadillac Hotel

Annual Dinner
Presentation of Awards

Friday, Oct. 17

9:30 A. M.—Crystal Ballroom, Book-Cadillac Hotel

Inert-Arc Welding

Aircomatic Welding of Refinery Components and Pressure Vessels, by S. Yaczko, United Engineers & Constructors, Inc.

Sigma Welding of Carbon Steels, by H. T. Herbst and T. McElrath, Jr., Linde Air Products Co.

Performance of High-Strength Aluminum Alloy Weldments, by W. R. Apblett and W. S. Pellini, Metallurgy Division, Naval Research Laboratory.

Thoriated Tungsten Electrodes—Their Welding Characteristics and Applications, by G. J. Gibson and R. O. Seitz, Air Reduction Sales Co.

9:30 A. M.—Italian Garden, Book-Cadillac Hotel

Metallizing

The Metallizing Process, by F. J. Keller, Aluminum Research Laboratories, Aluminum Co. of America.

Modern Developments in Metallizing, by Sam Tour, Sam Tour and Co.

Today's Metallizing Applications, by K. B. Smith, Dix Engineering Co.

Annual Fall Meeting

INSTITUTE OF METALS DIVISION, A. I. M. E.

Detroit-Leland Hotel, Detroit, Oct. 15-17, 1951

Sunday, Oct. 14

7:00 P. M.—Tropical Room, Detroit-Leland Hotel

Program Committee Meeting

7:00 P. M.—New York Room, Detroit-Leland Hotel

Publications Committee Meeting

Monday, Oct. 15

9:00 A. M.—Jade Room, Detroit-Leland Hotel

Grain Growth and Recrystallization

Grain Structure of Aluminum-Killed Low-Carbon Steel, by R. L. Solter and C. W. Beattie, Armco Steel Corp.

Theory of Grain Boundary Migration Rates, by D. Turnbull, General Electric Co.

Secondary Recrystallization in Copper Wire, by G. Bassi, Svenska Metallverken, Sweden.

Cleavage and Polygonization of Molybdenum Single Crystals, by N. K. Chen and R. Maddin, Johns Hopkins University.

9:00 A. M.—Colonial Room, Detroit-Leland Hotel

Alloys Systems—I

Systems Titanium-Molybdenum and Titanium-Columbium, by M. Hansen, H. D. Kessler and D. J. McPherson, Armour Research Foundation, and E. L. Kamen, U. S. Naval Reserve.

Crystal Structure of Ti_5Si_3, Ti_5Ge_3, and Ti_5Sn_3, by P. Pietrokowski and Pol Duwez, California Institute of Technology.

Solidification of Lead-Tin Alloy Droplets, by J. H. Hollomon and D. Turnbull, General Electric Co.

Equilibrium Relations in Magnesium-Aluminum-Manganese Alloys, by R. J. Nelson, Aluminum Co. of America.

Constitution and Precipitation Hardening Properties of Copper-Rich Copper-Tin-Beryllium Alloys, by R. A. Cresswell and J. W. Cuthbertson, Tin Research Institute, England.

2:00 P. M.—Jade Room, Detroit-Leland Hotel

Seminar on Dislocations in Metals

Nature of Dislocations, by Frederick Seitz, University of Illinois.

Role of Dislocations in Crystal-Growth and Grain-Boundary Phenomena, by W. T. Read, Bell Telephone Laboratories.

7:00 P. M.—New York Room, Detroit-Leland Hotel

Membership Committee Meeting

8:00 P. M.—Jade Room, Detroit-Leland Hotel

Seminar on Dislocations in Metals

Theories of Dislocations as Applied to Mechanical Behavior, by Egon Orowan, Massachusetts Institute of Technology.

Tuesday, Oct. 16

9:00 A. M.—Jade Room, Detroit-Leland Hotel

Transformations

Rapid Tempering of High Speed Steel, by A. E. Powers, General Electric Co., and J. F. Libsch, Lehigh University.

Effect of Rate of Cooling on the Alpha-Beta Transformation in Titanium and Titanium-Molybdenum Alloys, by Pol Duwez, California Institute of Technology.

Burst Phenomenon in the Martensitic Transformation, by E. S. Machlin and Morris Cohen, Massachusetts Institute of Technology.

Isothermal Formation of Martensite at Subzero Temperatures in a High-Chromium Steel, by S. C. Das Gupta, University of Notre Dame, and B. S. Lement, Massachusetts Institute of Technology.

Isothermal Transformation and Properties of a Commercial Aluminum Bronze, by A. H. Kasberg, Jr., Westinghouse Electric Corp., and D. J. Mack, University of Wisconsin.

9:00 A. M.—Colonial Room, Detroit-Leland Hotel

Alloy Systems—II

Crystal Structure of UAl_3, by B. S. Borie, Jr., Oak Ridge National Laboratories.

Intermediate Phases in Ternary Alloy Systems of Transition Elements, by P. A. Beck, University of Notre Dame; Sheldon Rideout and W. D. Manly, Oak Ridge National Laboratories; E. L. Kamen, U. S. Naval Reserve, and B. S. Lement, Massachusetts Institute of Technology.

Intermetallic Compounds in the System Molybdenum-Beryllium, by S. G. Gordon and G. E. Klein, Los Alamos Scientific Laboratory; J. A. McGurty and W. J. Koshuba, NEPA Project.

Chromium-Nickel Phase Diagram, by S. Bloom and N. J. Grant, Massachusetts Institute of Technology.

Thermal Variation of Young's Modulus in Some Fe-Ni-Mo Alloys, by Morris E. Fine and W. C. Ellis, Bell Telephone Laboratories.

Effect of Tungsten or Molybdenum Upon the Alpha-Beta Transformation and Gamma Precipitation in Cobalt-Chromium Alloys, by A. R. Elsea and E. E. Fletcher, Battelle Memorial Institute.

12:15 P. M.—New York Room, Detroit-Leland Hotel

Institute of Metals Division
Executive Committee Luncheon Meeting

2:00 P. M.—Jade Room, Detroit-Leland Hotel

Light Metals

Effects of Precompression on the Behavior of the Aluminum Alloy 24S-T4 During Cyclic Direct Stressing, by S. I. Liu, Pei-Yank University.

Structure Studies of Plastic Deformation in Aluminum Single Crystals, by N. K. Chen, Johns Hopkins University, and C. H. Mathewson, Yale University.

Effect of Alloying Elements on the Elevated-Temperature Plastic Properties of Alpha Solid Solutions of Aluminum, by J. E. Dorn, O. D. Sherby and R. A. Anderson, University of California.

Effect of Alloying Elements on the Electrical Resistivity of Aluminum Alloys, by A. T. Robinson and J. E. Dorn, University of California.

2:00 P. M.—Colonial Room, Detroit-Leland Hotel

Creep

Fundamental Effects of Cold Working on the Creep Resistance of an Austenitic Alloy, by D. N. Frey and J. W. Freeman, University of Michigan.

Creep Characteristics of Some Platinum Metals at 1382° F., by Ralph H. Atkinson and D. R. Furman, International Nickel Co.

(Continued on next page)

Tuesday, Oct. 16

Session on Creep (Cont.)

Creep Behavior of Zinc as Modified by Copper in the Surface Layer, by Earl R. Parker and M. R. Pickus, University of California.

Creep and Stress-Rupture Behavior of Aluminum as a Function of Purity, by Italo S. Servi and N. J. Grant, Massachusetts Institute of Technology.

7:00 P. M.—Jade Room, Detroit-Leland Hotel

Institute of Metals Division Annual Fall Dinner

Wednesday, Oct. 17

12:15 P. M.—New York Room, Detroit-Leland Hotel

Powder Metallurgy Committee Luncheon Meeting

2:00 P. M.—Colonial Room, Detroit-Leland Hotel

High-Temperature Oxidation

Oxidation of Titanium, by M. H. Davies and C. E. Birchenall, Carnegie Institute of Technology.

Thermal Stability of the Chromium, Iron and Tungsten Borides in Steaming Ammonia and the Existence of a New Tungsten Nitride, by Roland Kiessling and Y. H. Liu, University of Upsala, Sweden.

High-Temperature Oxidation of Copper-Palladium and Copper-Platinum Alloys, by D. E. Thomas, Westinghouse Electric Corp.

Mechanism and Kinetics of the Scaling of Iron, by M. H. Davies, M. Y. Simnad, and C. E. Birchenall, Carnegie Institute of Technology.

2:30 P. M.—Jade Room, Detroit-Leland Hotel

Powder Metallurgy

Role of Gases in the Production of High-Density Powder Compacts, by Donald Warren and J. F. Libsch, Lehigh University.

Solubility Relationships in Some of the Ternary Systems of Refractory Mono-Carbides, by John T. Norton, Massachusetts Institute of Technology and A. L. Mowry, Kaiser Aluminum and Chemical Co.

11th Annual Meeting

Society for Non-Destructive Testing, Inc.

Flamingo Room, Hotel Detroiter, Oct. 15-18, 1951

Monday, Oct. 15

Morning Session

Ultrasonic Testing

(Four Papers to be Announced)

Afternoon Session

The Triboelectric Effect and Its Application to Sorting Metals, by Anthony Doschek, Doschek Associates.

The Testing of Ceramics, by Harry Staats, Magnaflux Corp.

Stress Analysis by Magnetic Methods, by P. E. Cavanaugh, Ontario Research Foundation.

Tuesday, Oct. 16

Morning Session

Pickup and Recording of Magnetic Leakage Fields, by Carlton Hastings, Watertown Arsenal.

Photoelectric Scanning of Magnetic Particle Indications, by S. A. Wenk and Donald Cooley, Battelle Memorial Institute.

Multi-Directional Magnetic Particle Inspection, by R. A. Peterson, Magnaflux Corp.

Tuesday, Oct. 16

Afternoon Session

T-V Pickup of X-Ray Images, by Russell Morgan, Johns Hopkins University.

T-V Pickup of X-Ray Images With Pin-Point Aperture, by Robert J. Moon, University of Chicago, Institute of Radiobiology & Biophysics.

Selection of X-Ray Detectors for Automatic X-Ray Inspection Applications, by J. E. Jacobs and A. L. Pace, General Electric X-Ray Corp.

Intensifying the Brightness of Fluoroscopic Images, by Walter S. Lusby, X-Ray Engineering Department, Westinghouse Electric Corp.

Wednesday, Oct. 17

Morning Session

Symposium on Ordnance Material Testing

Afternoon Session

Symposium on Jet Engine Parts Inspection

Thursday, Oct. 18

Morning Session

The Metallurgists Role in the Interpretation of Nondestructive Tests, by Scott Henry, A. O. Smith Corp.

(Several other papers on general subjects pertaining to nondestructive testing and special research papers on phases of radiography.)

Afternoon Session

Lester Honor Lecture

To be Presented by Donald McCutcheon, Ford Motor Co.

11th Annual Business Meeting

Reserve These Dates on Your Calendar—Oct. 20-24, 1952

NATIONAL METAL CONGRESS and NATIONAL METAL EXPOSITION

PHILADELPHIA, PA.

World Metallurgical Congress

STUDY TOUR ITINERARIES

New York to Detroit, Sept. 13 to Oct. 13, 1951

NEW YORK AND WASHINGTON ACTIVITIES FOR ALL STUDY TOURS

New York Headquarters at Park Sheraton Hotel; Washington Headquarters at Raleigh Hotel

Thursday, Sept. 13—New York City

Registration for World Metallurgical Congress

Conferees will report to the registration desk on the ballroom floor of the Park Sheraton Hotel to be assigned to study tour managers and escorts, receive credentials, and make reservations for return trip to homelands in October.

Friday, Sept. 14—New York City

9:00 A.M.—Colonial Room, Park Sheraton Hotel

Meeting of all conferees with representatives of the Economic Cooperation Administration.

11:00 A.M.—Park Sheraton Hotel

Separate meetings of the eight study tour groups with tour managers and escorts.

Saturday, Sept. 15—New York City

9:00 A.M.—Park Sheraton Hotel

Separate meetings of the eight study tour groups with tour managers and escorts.

Sunday, Sept. 16—New York City

4:00 P.M.—Ballroom, Park Sheraton Hotel

Mass meeting of all conferees, tour escorts and tour managers to meet and be welcomed by Zay Jeffries, director-general, World Metallurgical Congress; Walter Jominy, president, American Society for Metals; and William H. Eisenman, secretary, American Society for Metals.

Monday, Sept. 17—New York City

12:30 P.M.—Starlight Room, Waldorf-Astoria Hotel

A.S.M. Complimentary Luncheon for Foreign Conferees.

Monday, Sept. 17—Newark, N. J.

4:00 P.M.—New Jersey Chapter Meeting, Essex House

Special buses will take conferees to joint meeting of New Jersey and New York Chapters of A.S.M., preceded by cocktails and dinner. Speaker—Walter Jominy, President, A.S.M. Subject—"Hardenability".

Tuesday, Wednesday and Thursday, Sept. 18, 19, 20

Individual study tour groups will visit various eastern centers, as indicated by the itineraries below. All groups will then reassemble in Washington.

Friday, Sept. 21—Washington, D. C.

12:30 P.M.—Mayflower Hotel

A.S.M. Complimentary Luncheon—"Welcome to the Nation's Capital."

8:00 P.M.—Dept. of Commerce Auditorium

National Officers' Night of the Washington Chapter A.S.M. Speaker—John Chipman, Massachusetts Institute of Technology, President-Elect of A.S.M. Subject—"Chemistry of Liquid Steel."

10:30 P.M.—Raleigh Hotel

Reception and Refreshments by Washington Chapter.

Saturday, Sept. 22—Washington, D. C.

No formal program. Afternoon free for personal use. Tour managers will assist interested groups with sightseeing arrangements.

Sunday, Sept. 23—Washington, D. C.

Individual study tour groups re-form and resume travel.

TOUR NO. 1—STEELMAKING AND REFINING

Tuesday, Sept. 18—Kearny, N. J.

Visit to **Research Laboratory of U. S. Steel Co.**
Noon—Luncheon as guests of U. S. Steel Co.

Wednesday, Sept. 19—Syracuse, N. Y.

Visit to Sanderson-Halcomb Plant of **Crucible Steel Co. of America.**
1:00 P.M.—Luncheon at Mills Hotel as guests of the company.

Thursday, Sept. 20—Philadelphia, Pa.

Visit to Nicetown Plant of **Midvale Co.**
Noon—Luncheon as guests of Midvale Co.

Friday, Saturday, Sunday, Sept. 21, 22, 23 Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Baltimore, Md.

Visit to Sparrows Point plant of **Bethlehem Steel Co.**
1:00 P.M.—Luncheon as guests of Bethlehem Steel Co.

Tuesday, Sept. 25—Baltimore, Md.

9:30 A.M.—Meeting at Sheraton Belvedere Hotel for discussion and report preparation.
Afternoon spent in travel to Harrisburg, Pa.

Wednesday, Sept. 26—Lebanon, Pa.

Visit to **Lebanon Steel Foundry.**
12:30 P.M.—Luncheon as guests of the company.

Thursday, Sept. 27—Pittsburgh, Pa.

Visit to Midland plant of **Crucible Steel Co. of America.**
1:00 P.M.—Luncheon as guests of Crucible Steel Co.

Friday, Sept. 28—Aliquippa, Pa.

Visit to Aliquippa plant of **Jones & Laughlin Steel Co.**

Saturday and Sunday, Sept. 29 and 30 Pittsburgh, Pa.

No formal program.

Monday, Oct. 1—Pittsburgh, Pa.

Visit to Irvin Works of **United States Steel Co.** at Dravosburg, Pa.

Tuesday, Oct. 2—Weirton, W. Va.

Visit to **Weirton Steel Co.**
12:15 P.M.—Luncheon as guests of the Company.
5:30 P.M.—Dinner as guests of the Company.

Wednesday, Oct. 3—Middletown, Ohio

Visit to East Works plant of **Armco Steel Corp.**
1:00 P.M.—Luncheon as guests of Armco Steel Corp. at Manchester Hotel.

Thursday, Oct. 4—Chicago, Ill.

Visit to **Inland Steel Co.**
Noon—Luncheon as guests of Inland Steel Co.

Friday, Oct. 5—Gary, Ind.

Visit to Gary plant of **U. S. Steel Co.**
Noon—Luncheon as guests of the company.

Saturday, Oct. 6—Chicago, Ill.

No formal program.

Sunday, Oct. 7—Detroit, Mich.

No formal program.

Monday, Oct. 8—Detroit, Mich.

Visit to Carbon Steel Foundry of **Ford Motor Co.**
12:30 P.M.—Luncheon as guests of Ford Motor Co.
6:30 P.M.—Regular monthly meeting of Detroit Chapter A.S.M. (See "Special Events in Detroit, World Metallurgical Congress," page 28A.)

Tuesday, Oct. 9—Detroit, Mich.

Visit to **Great Lakes Steel Corp.**
Noon—Luncheon as guests of Great Lakes Steel Corp.

Wednesday, Oct. 10—Detroit, Mich.

Visit to Trenton Plant of **McLouth Steel Co.**
2:00 P.M.—Meeting at Tuller Hotel for discussion and report writing.

Thursday, Oct. 11—Detroit, Mich.

Visit to **Rotary Electric Steel Co.**
1:00 P.M.—Luncheon as guests of Rotary Electric Steel Co. at Red Run Country Club.

Friday, Oct. 12—Detroit, Mich.

9:00 A.M. and 2:00 P.M.—Meeting to consolidate reports.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit, World Metallurgical Congress," page 28A.

TOUR NO. 2—NONFERROUS REFINING AND FABRICATION

Tuesday, Sept. 18—Waterbury, Conn.

11:45 A.M.—Luncheon with officials of Scovill Mfg. Co. at Hotel Elton.
1:15 P.M.—Visit to casting shop and strip mill of **Scovill Mfg Co.**

Wednesday, Sept. 19—Waterbury, Conn.

Visit to **American Brass Co.**
12:30 P.M.—Luncheon as guests of American Brass Co.

Thursday, Sept. 20—Carteret, N. J.

Visit to **U. S. Metals Refining Co.**
Noon—Luncheon as guests of company at hotel in Elizabeth, N. J.

Friday, Saturday, Sunday, Sept. 21, 22, 23 Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Philadelphia, Pa.

Visit to **Riverside Metal Co.**, Riverside, N. J.
Noon—Luncheon as guests of Riverside Metal Co.
2:45 P.M.—Visit to **Franklin Institute**, Philadelphia.

Tuesday, Sept. 25—Rome, N. Y.

Visit to **Revere Copper & Brass Co., Inc.**
12:30 P.M.—Luncheon as guests of the company.

Wednesday, Sept. 26, Buffalo, N. Y.

Visit to Buflovak Division of **Blaw-Knox Co.**

Thursday, Sept. 27—Buffalo, N. Y.

9:30 A.M.—Meeting at Sheraton Hotel for discussion and report preparation.

Friday, Sept. 28—Cleveland, Ohio

10:30 A.M.—Visit to **A.S.M. Headquarters.**
11:45 A.M—Complimentary luncheon at University Club.
1:45 P.M.—Visit to **Chase Brass & Copper Co.**

Saturday, Sept. 29—Cleveland, Ohio

3:00 P.M.—"Welcome to Sunnimoor Farm", summer home of W. H. Eisenman, A.S.M. national secretary

Sunday, Sept. 30—Cleveland, Ohio

No formal program

Monday, Oct. 1—Chicago, Ill.

9:00 A.M. and 2:00 P.M.—Meeting at Sheraton Hotel for discussion, conferences and report preparation.

Tuesday, Oct. 2—Chicago, Ill.

Visit to **Reynolds Metals Co.**, McCook, Ill.
12:30 P.M.—Luncheon as guests of Reynolds Metals Co.

Wednesday, Oct. 3—Chicago, Ill.

Visit to **Stewart Die Casting Co.**
Afternoon free for personal use.

Thursday, Oct. 4—Hammond, Ind.

Visit to **Hammond Brass Works.**
Afternoon free for return to Chicago and personal use.

Friday, Oct. 5—Chicago, Ill.

Visit to **H. Kramer & Co.**

Saturday and Sunday, Oct. 6 and 7—Chicago, Ill.

No formal program.

Monday, Oct. 8—Chicago, Ill.

Visit to **Apex Smelting Co.**
1:00 P.M.—Lunch in plant cafeteria.

Tuesday, Oct. 9—Detroit, Mich.

Visit to **McCord Corp.**

Wednesday, Oct. 10—Midland, Mich.

Visit to **Dow Chemical Co.**
12:30 P.M.—Luncheon as guests of Dow Chemical Co. at Midland Country Club.
2:20 P.M.—Visit to Dow Magnesium Foundry at Bay City.

Thursday, Oct. 11—Port Huron, Mich.

Visit to **Mueller Brass Co.**
Noon—Luncheon as guests of Mueller Brass Co. at Black River Country Club.

Friday, Oct. 12—Detroit, Mich.

Visit to **Bohn Aluminum & Brass Corp.**
2:00 P.M.—Meeting to consolidate reports.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A

TOUR NO. 3—FERROUS FABRICATION

(Cold Work, Stamping, Machining, Finishing)

Tuesday, Sept. 18—Waterbury, Conn.

Visit to **American Brass Co.**
Noon—Luncheon as guests of American Brass Co.

Wednesday, Sept. 19—West Hartford, Conn.

Visit to **Pratt & Whitney Division, Niles-Bement-Pond Co.**
Noon—Luncheon as guests of Pratt & Whitney.

Thursday, Sept. 20—Worcester, Mass.

Visit to **Worcester Pressed Steel Co.**
Noon—Luncheon as guests of Worcester Pressed Steel Co.

Friday, Saturday, Sunday, Sept. 21, 22, 23

Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Philadelphia, Pa.

Visit to **Budd Co.**
Noon—Luncheon as guests of Budd Co.

Tuesday, Sept. 25—Endicott, N. Y.

Visit to **International Business Machines Corp.**
Noon—Luncheon as guests of I.B.M.

Wednesday, Sept. 26—Midland, Pa.

Visit to Midland plant of **Crucible Steel Co. of America.**
Noon—Luncheon as guests of Crucible Steel Co.

Thursday, Sept. 27—Pittsburgh, Pa.

9:30 A.M.—Meeting at Sheraton Hotel for conferences, discussion and preparation of reports.

Friday, Sept. 28—Salem, Ohio

Visit to **Mullins Mfg. Co.**
Noon—Luncheon as guests of Mullins Mfg. Co.

Saturday, Sept. 29—Cleveland, Ohio

3:00 P.M.—"Welcome to Sunnimoor Farm", summer home of W. H. Eisenman, A.S.M. national secretary.

Sunday, Sept. 30—Cleveland, Ohio

No formal program.

Monday, Oct. 1—Cleveland, Ohio

Visit to **Lamson & Sessions Co.**
1:15 P.M.—Visit to **A. S. M. Headquarters.**
3:00 P.M.—Meeting at Statler Hotel.

Tuesday, Oct. 2—Dayton, Ohio

Visit to **Frigidaire Division of General Motors Corp.**
Noon—Luncheon as guests of Frigidaire Division.

Wednesday, Oct. 3—Cincinnati, Ohio

Visit to **Cincinnati Milling Machine Co.**
Noon—Luncheon as guests of Cincinnati Milling Machine Co.

Thursday, Oct. 4—Rockford, Ill.

Visit to **National Lock Co.**
12:45 P.M.—Luncheon at Faust Hotel.
2:00 P.M.—Conference with National Lock officials.

Friday, Oct. 5—Elgin, Ill.

Visit to **Elgin National Watch Co.**
11:45 A.M.—Luncheon as guests of the company.

Saturday, Oct. 6—Chicago, Ill.

No formal program.

Sunday, Oct. 7—Detroit, Mich.

No formal program.

Monday, Oct. 8—Detroit, Mich.

Visit to **Dodge Division of Chrysler Corp.**
6:30 P.M.—Regular monthly meeting of Detroit Chapter A.S.M. (See "Special Events in Detroit, World Metallurgical Congress," page 28A.)

Tuesday, Oct. 9—Detroit, Mich.

Visit to **Ford Motor Co.**
Noon—Luncheon as guests of Ford Motor Co.
1:30 P.M.—Special bus to Tuller Hotel via Greenfield Village, Dearborn.

Wednesday, Oct. 10—Detroit, Mich.

Visit to **Kelsey-Hayes Wheel Co.**
2:00 P.M.—Meeting at Tuller Hotel to consolidate reports.

Thursday, Oct. 11—Detroit, Mich.

Visit to **Briggs Mfg. Co.**
2:00 P.M.—Meeting at Tuller Hotel to consolidate reports.

Friday, Oct. 12—Plymouth, Mich., and Detroit

Visit to **Barnes-Gibson-Raymond, Inc.** at Plymouth.
2:00 P.M.—Meeting at Tuller Hotel to consolidate reports.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A

TOUR NO. 4—HEAT TREATING

Tuesday, Sept. 18—Hartford, Conn.

Visit to **Pratt & Whitney Division, Niles-Bement-Pond Co.**
8:00 P.M.—Technical meeting with Hartford Chapter A.S.M.

Wednesday, Sept. 19—Bristol, Conn.

Visit to **New Departure Division of General Motors Corp.**
Noon—Luncheon as guests of New Departure Division.

Thursday, Sept. 20—Philadelphia, Pa.

Visit to **Leeds & Northrup Co.**
Noon—Luncheon as guests of Leeds & Northrup Co. at Philadelphia Cricket Club.

Friday, Saturday, Sunday, Oct. 21, 22, 23
Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Philadelphia, Pa.

Visit to **Metlab Co.**
Noon—Luncheon as guests of Metlab Co. at Alden Park Manor.
2:00 P.M.—Visit to Franklin Institute.

Tuesday, Sept. 25—Bethlehem, Pa.

Visit to **Bethlehem Steel Co.**
Noon—Luncheon as guests of Bethlehem Steel Co.

Wednesday, Sept. 26—Cleveland, Ohio

10:00 A.M.—Visit to **Case Institute of Technology.**
12:00 M.—Complimentary luncheon at University Club.
2:00 P.M.—Visit to **A.S.M. Headquarters.**

Thursday, Sept. 27—Cleveland, Ohio

Visit to **National Malleable & Steel Castings Co.**
1:00 P.M.—Luncheon as guests of National Malleable & Steel Castings Co.

Friday, Sept. 28—Canton, Ohio

Visit to **Ford Motor Co.**
Noon—Luncheon as guests of Ford Motor Co.

Saturday, Sept. 29—Cleveland, Ohio

3:00 P.M.—"Welcome to Sunnimoor Farm", summer home of W. H. Eisenman, A.S.M. national secretary.

Sunday, Sept. 30—Cleveland, Ohio

No formal program.

Monday, Oct. 1—Dayton, Ohio

Visit to **Dayton Forging & Heat Treating Co.**

Tuesday, Oct. 2—Muncie, Ind.

Visit to **Warner Gear Division of Borg-Warner Co.**
Noon—Luncheon as guests of Warner Gear Division.

Wednesday, Oct. 3—Chicago, Ill.

Visit to **Lindberg Engineering Co.**
Noon—Smorgasbord as guests of Lindberg Engineering Co.

Thursday, Oct. 4—Peoria, Ill.

Visit to **Caterpillar Tractor Co.**
Noon—Luncheon as guests of Caterpillar Tractor Co.

Friday, Oct. 5—Chicago, Ill.

Visit to Tractor Works of **International Harvester Co.**
Noon—Luncheon as guests of International Harvester Co.

Saturday, Oct. 6—Chicago, Ill.

No formal program.

Sunday, Oct. 7—Detroit, Mich.

No formal program.

Monday, Oct. 8—Detroit, Mich.

Visit to **Chevrolet Division of General Motors Corp.**
Noon—Luncheon as guests of Chevrolet Division.
6:30 P.M.—Regular monthly meeting of Detroit Chapter A.S.M. (See "Special Events in Detroit—World Metallurgical Congress," page 28A.)

Tuesday, Oct. 9—Detroit, Mich.

Visit to **Commercial Steel Treating Corp.**
2:00 P.M.—Meeting at Tuller Hotel to consolidate reports.

Wednesday, Oct. 10—Toledo, Ohio

Visit to **Spicer Division of Dana Corp.**
11:00 A.M.—Luncheon as guests of Spicer Division.

Thursday, Oct. 11—Flint, Mich.

Visit to **Buick Motor Division of General Motors Corp.**
Noon—Luncheon as guests of Buick Motor Division.

Friday, Oct. 12—Saginaw, Mich.

Visit to **Saginaw Steering Gear Division of General Motors Corp.**
Noon—Luncheon as guests of Saginaw Steering Gear Div.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A

TOUR NO. 5—WELDING AND JOINING

Tuesday, Sept. 18—Troy, N. Y.

Visit to **Rensselaer Polytechnic Institute.**
Noon—Luncheon at the Institute.

Wednesday, Sept. 19—Jersey City, N. J.

Visit to **M. W. Kellogg Co.**
1:30 P.M.—Luncheon as guests of M. W. Kellogg Co.

Thursday, Sept. 20—Murray Hill, N. J.

Visit to **Air Reduction Co.**
Noon—Luncheon as guests of the company.

Friday, Saturday, Sunday, Sept. 21, 22, 23
Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Philadelphia, Pa.

2:30 P.M.—Visit to **Franklin Institute.**

Tuesday, Sept. 25—Philadelphia, Pa.

9:30 A.M. and 2:00 P.M.—Meetings at Penn Sheraton for conferences and report preparation.

Wednesday, Sept. 26—Pittsburgh, Pa.

Visit to **Westinghouse Electric Corp.**
Noon—Luncheon as guests of Westinghouse Electric Corp.

Thursday, Sept. 27—Anderson, Ind.

Visit to **Delco-Remy Division of General Motors Corp.**
Noon—Luncheon as guests of Delco-Remy Division.

Friday, Sept. 28—LaGrange, Ill.

Visit to **Electro-Motive Division of General Motors Corp.**
Noon—Luncheon as guests of Electro-Motive Div.

Saturday and Sunday, Sept. 29 and 30—Chicago, Ill.

No formal program.

Monday, Oct. 1—Chicago, Ill.

Visit to **Chicago Bridge & Iron Co.**

Tuesday, Oct. 2—Chicago, Ill.

Visit to Maywood Sanitary Plant of **American Can Co.**
Noon—Luncheon as guests of American Can Co.

Wednesday, Oct. 3—Chicago, Ill.

Visit to **Hotpoint, Inc.**
1:15 P.M.—Luncheon as guests of Hotpoint, Inc.

Thursday, Oct. 4—Milwaukee, Wis.

Visit to **Harnishfeger Corp.**

Friday, Oct. 5—Milwaukee, Wis.

Visit to **A. O. Smith Corp.**

Saturday and Sunday, Oct. 6 and 7—Chicago, Ill.

No formal program.

Monday, Oct. 8—Michigan City, Ind.

Visit to **Pullman-Standard Car Mfg. Co.**
Noon—Luncheon as guests of the company.

Tuesday, Oct. 9—Detroit, Mich.

Visit to **McCord Corp.**

Wednesday, Oct. 10—Detroit, Mich.

Visit to **Murray Corp. of America.**
Noon—Luncheon as guests of Murray Corp.

Thursday, Oct. 11—Detroit, Mich.

Visit to **Nash-Kelvinator Corp.**
12:45 P.M.—Luncheon as guests of Nash-Kelvinator Corp.

Friday, Oct. 12—Detroit, Mich.

9:00 A.M. and 2:00 P.M.—Meetings to consolidate reports.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A.

TOUR NO. 6—INSPECTION AND TESTING

Tuesday, Sept. 18—Hartford, Conn.

Visit to **Pratt & Whitney Division, Niles-Bement-Pond Co.**
Noon—Luncheon as guests of Pratt & Whitney Division.

Wednesday, Sept. 19—Philadelphia, Pa.

10:00 A.M.—Visit to **American Society for Testing Materials.**
2:00 P.M.—Visit to **Budd Co.**

Thursday, Sept. 20—Philadelphia, Pa.

Visit to Eddystone plant of **Baldwin-Lima-Hamilton Corp.**
Noon—Luncheon as guests of the corporation.

Friday, Saturday, Sunday, Sept. 21, 22, 23
Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—White Oak, Md.

Visit to **Naval Ordnance Laboratory**
12:45 P.M.—Lunch at Naval Ordnance Plant.

Tuesday, Sept. 25—Pittsburgh, Pa.

Visit to **Pittsburgh Testing Laboratory.**

Wednesday, Sept. 26—Pittsburgh, Pa.

9:30 A.M.—Meeting for discussion and preparation of reports at Sheraton Hotel.

Thursday, Sept. 27—Pittsburgh, Pa.

Visit to Aliquippa Works, **Jones & Laughlin Steel Corp.**
Noon—Luncheon as guests of Jones & Laughlin.

Friday, Sept. 28—Cleveland, Ohio

Visit to **A.S.M. Headquarters.**
11:45 A.M.—Complimentary luncheon at University Club.

Saturday, Sept. 29—Cleveland, Ohio

3:00 P.M.—"Welcome to Sunnimoor Farm", summer home of W. H. Eisenman, A.S.M. national secretary.

Sunday, Sept. 30—Cleveland, Ohio

No formal program.

Monday, Oct. 1—Indianapolis, Ind.

2:00 P.M.—Meeting at Claypool Hotel for conferences and report preparation.

Tuesday, Oct. 2—Indianapolis, Ind.

Visit to **Western Electric Co.**
Noon—Luncheon as guests of Western Electric Co.

Wednesday, Oct. 3—Urbana, Ill.

Visit to **University of Illinois.**
Noon—Luncheon as guests of the University.

Thursday, Oct. 4—Peoria, Ill.

Visit to **Caterpillar Tractor Co.**
Noon—Luncheon as guests of Caterpillar Tractor Co.
8:00 P.M.—Reception by Peoria Chapter A.S.M.

Friday, Oct. 5—Chicago, Ill.

Visit to **Armour Research Foundation, Illinois Institute of Technology.**
Noon—Luncheon as guests of the Institute.

Saturday and Sunday, Oct. 6 and 7—Chicago, Ill.

No formal program.

Monday, Oct. 8—Toledo Ohio and Detroit, Mich.

Visit to **Willys-Overland Co.**, Toledo.
Noon—Luncheon as guests of Willys-Overland Co.
6:30 P.M.—Regular monthly meeting of Detroit Chapter A.S.M. See "Special Events in Detroit—World Metallurgical Congress," page 28A.)

Tuesday, Oct. 9—Detroit, Mich.

Visit to **Great Lakes Steel Corp.**
Noon—Luncheon as guests of Great Lakes Steel Corp.

Wednesday, Oct. 10—Detroit, Mich.

Visit to **Ford Motor Co.**
Noon—Luncheon as guests of Ford Motor Co.

Thursday, Oct. 11—Detroit, Mich.

Visit to **Diesel Engine Division of General Motors Corp.**
Noon—Luncheon as guests of General Motors Corp.

Friday, Oct. 12—Pontiac, Mich.

Visit to **Pontiac Motor Division of General Motors Corp.**
Noon—Luncheon as guests of Pontiac Motor Division.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A.

TOUR NO. 8—METALLURGICAL EDUCATION

Tuesday, Sept. 18—New Haven, Conn.

Visit to **Yale University.**

Wednesday, Sept. 19—Hoboken, N. J.

Visit to **Stevens Institute of Technology.**

Thursday, Sept. 20—New York City

Visit to **Columbia University.**
Noon—Luncheon as guests of Columbia University.

Friday, Saturday, Sunday, Sept. 21, 22, 23
Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Washington, D. C.

Visit to **National Bureau of Standards.**
12:15 P.M.—Lunch at Bureau of Standards.

Tuesday, Sept. 25—Philadelphia, Pa.

Visit to **Franklin Institute.**
Noon—Lunch at Franklin Institute.

Wednesday, Sept. 26—Bethlehem, Pa.

Visit to **Lehigh University.**

Thursday, Sept. 27—Cambridge, Mass.

Visit to **Massachusetts Institute of Technology.**
Noon—Luncheon as guests of the Institute.

Friday, Sept. 28—Cambridge, Mass.

Visit to **Harvard University.**
Noon—Luncheon as guests of the University.

Saturday, Sept. 29—Boston, Mass.

No formal program.

Sunday, Sept. 30—Pittsburgh, Pa.

No formal program.

Monday, Oct. 1—Pittsburgh, Pa.

Visit to **Carnegie Institute of Technology.**
Noon—Lunch at the Institute Cafeteria.

Tuesday, Oct. 2—Columbus, Ohio

Visit to **Battelle Memorial Institute.**

Wednesday, Oct. 3——Lafayette, Ind.

Visit to **Purdue University.**
Noon—Lunch at Purdue Memorial Union.

Thursday, Oct. 4—Chicago, Ill.

Visit to **Northwestern University.**

Friday, Oct. 5—Chicago, Ill.

Visit to **Illinois Institute of Technology.**
Noon—Lunch at Armour Research Foundation as guests of the Institute.

Saturday, Oct. 6—Chicago, Ill.

No formal program.

Sunday, Oct. 7—Detroit, Mich.

No formal program.

Monday, Oct. 8—Detroit, Mich.

Visit to **Chrysler Institute of Engineering.**
Noon—Luncheon as guests of the company.
6:30 P.M.—Regular monthly meeting of Detroit Chapter A.S.M. (See "Special Events in Detroit, World Metallurgical Congress," page 28A.)

Tuesday, Oct. 9—Ann Arbor, Mich.

Visit to **University of Michigan,** Engineering Building
Noon—Lunch at the University.

Wednesday, Oct. 10—Flint, Mich.

Visit to **General Motors Technical School.**
Noon—Luncheon as guests of General Motors Corp.

Thursday, Oct. 11—Detroit, Mich.

Visit to **Ford Technical School.**
12:30 P.M.—Lunch at Dearborn Inn

Friday, Oct. 12—Detroit, Mich.

9:30 A.M. and 2:00 P.M.—Meetings at Tuller Hotel to consolidate reports.

Sunday through Friday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A.

TOUR NO. 9—METALLURGICAL RESEARCH

Tuesday, Sept. 18—New York City

Visit to **New York University.**

Wednesday, Sept. 19.—Kearny, N. J.

Visit to **U. S. Steel Research Laboratory.**
Noon—Luncheon as guests of the Laboratory.

Thursday, Sept. 20—Murray Hill, N. J.

Visit to **Bell Telephone Research Laboratories**
Noon—Luncheon as guests of Bell Laboratories.

Friday, Saturday, Sunday, Sept. 21, 22, 23

Washington, D. C.

All tour groups assemble at nation's Capital for activities outlined above.

Monday, Sept. 24—Washington, D. C.

Visit to **National Bureau of Standards.**
Noon—Lunch at Bureau's Cafeteria.
2:15 P.M.—Visit to **Naval Research Laboratories,** Anacostia, D. C.

(Tour 9 continued on page 29A)

Special Events in Detroit

WORLD METALLURGICAL CONGRESS

National Metal Congress and Exposition, Oct. 13-19, 1951

Monday, Oct. 8

6:30 P.M.—Rackham Engineering Society Bldg.

A.S.M. Detroit Chapter Dinner

8:00 P.M.—Rackham Engineering Society Bldg.

Regular Monthly Meeting of Detroit Chapter A.S.M.

"Metallurgy of Mechanical Springs"—William Park Woodside Annual Lecture by F. P. Zimmerli, Chief Engineer, Barnes-Gibson-Raymond.

Saturday, Oct. 13

10:00 A.M. and 2:00 P.M.—Ballroom, Hotel Statler

A.S.M. Seminar on Interfaces

Sunday, Oct. 14

(Church Services of your own choosing)

10:00 A.M. and 2:00 P.M.—Ballroom, Hotel Statler

A.S.M. Seminar on Interfaces

2:00 P.M.—A. S. M. Hall of Friendship, Hotel Tuller

Get-Acquainted Meeting With American Conferees

4:00 P.M.—Ballroom, Hotel Statler

Civic Welcome and Reception

8:00 P.M.—Ballroom, Hotel Statler

First Meeting of W.M.C.—"World Metal Resources"*

Monday, Oct. 15

9:30 A.M.—Hotel Tuller

Study Tour Meetings of Groups 2, 6 and 8

9:30 A.M.—Ballroom, Hotel Statler

A.S.M. Technical Session on Constitution Diagrams*

9:30 A.M.—Wayne Room, Hotel Statler

A.S.M.-W.M.C. Session on Melting and Refining*

12:00 M.—Michigan State Fair Grounds

Opening of National Metal Exposition and A.S.M. House of Friendship

2:00 P.M.—Michigan State Fair Grounds

Study Tour Meetings of Groups 3, 4 and 11

2:00 P.M.—Building M, Fair Grounds

A.S.M. Technical Session on Diffusion*

4:00 P.M.—House of Friendship, Fair Grounds

High Tea

8:00 P.M.—Building M, Fair Grounds

Lecture Course on Residual Stress Measurements

Tuesday, Oct. 16

9:30 A.M.—Hotel Tuller

Study Tour Meetings of Groups 1, 5 and 9

9:30 A.M.—Ballroom, Hotel Statler

A.S.M.-W.M.C. Session on High-Temperature Alloys*

9:30 A.M.—Wayne Room, Hotel Statler

A.S.M.-W.M.C. Session on Mechanical Metallurgy*

12:00 M.—Michigan State Fair Grounds

Opening of National Metal Exposition and A.S.M. House of Friendship

2:00 P.M.—Fair Grounds

Study Tour Meetings of Group 7 and 12

2:00 P.M.—Building M, Fair Grounds

A.S.M. Session on High-Temperature Alloys*

4:00 P.M.—House of Friendship, Fair Grounds

High Tea

4:30 P.M.—Building M, Fair Grounds

Lecture Course on Principles of Heat Treatment

8:00 P.M.—Building M, Fair Grounds

Lecture Course on Residual Stress Measurements

Wednesday, Oct. 17

9:30 A.M.—Ballroom, Hotel Statler

A.S.M. Annual Meeting and Campbell Memorial Lecture

12:00 M.—Hotel Statler and Hotel Tuller

American College Alumni Luncheons

12:00 M.—Michigan State Fair Grounds

Opening of National Metal Exposition and A.S.M. House of Friendship

2:00 P.M.—Fair Grounds

Adjourned Meetings of Study Tour Groups 1 through 12

2:00 P.M.—Building M, Fair Grounds

A.S.M. Technical Session on Embrittlement*

4:00 P.M.—House of Friendship, Fair Grounds

High Tea

4:30 P.M.—Building M, Fair Grounds

Lecture Course on Principles of Heat Treatment

8:00 P.M.—Building M, Fair Grounds

Lecture Course on Principles of Heat Treatment

*See list of papers in "Technical Program of American Society for Metals", page xx.

Thursday, Oct. 18

9:30 A.M.—Michigan State Fair Grounds

Adjourned Meetings of Study Tour Groups 1 through 12

9:30 A.M.—Building M, Fair Grounds

A.S.M.-W.M.C. Session on High-Temperature Phases*

2:00 P.M.—Michigan State Fair Grounds

Adjourned Meetings of Study Tour Groups 1 through 12

2:00 P.M.—Building M, Fair Grounds

A.S.M. Technical Session on Heat Treatment*

4:00 P.M.—House of Friendship, Fair Grounds

High Tea

7:00 P.M.—Ballroom, Hotel Statler

A.S.M. Annual Banquet

(Conferees may attend if they so desire. If they do not wish to purchase dinner tickets, they may attend the speaking which begins at 9:00 P.M.)

Friday, Oct. 19

9:30 A.M.—Building M, Fair Grounds

General Meeting of all W.M.C. Conferees

9:30 A.M.—Building M, Fair Grounds

A.S.M. Technical Session on Physical Metallurgy

2:00 P.M.—Building M, Fair Grounds

General Meeting of all W.M.C. Conferees

6:00 P.M.—National Metal Exposition closes

7:00 P.M.—Ballroom, Hotel Statler

Farewell Dinner for all W.M.C. Conferees

Speaker: Charles E. Wilson, Director, Office of Defense Mobilization.

Saturday, Oct. 20

Travel by special train from Detroit to New York, with six-hour visit to Niagara Falls.

Sunday and Monday, Oct. 21 and 22

Final activities for all foreign conferees in New York.

TOUR NO. 9—METALLURGICAL RESEARCH

(Continued from page 27A)

Tuesday, Sept. 25—Philadelphia, Pa.

Visit to **Franklin Institute.**

Wednesday, Sept. 26—Pittsburgh, Pa.

10:00 A.M.—Visit to **Atwood St. Laboratory of United States Steel Co.**

Afternoon—Visit to **Homestead Laboratory of U. S. Steel Co.**

Thursday, Sept. 27—New Kensington, Pa.

Visit to Research Laboratories of **Aluminum Co. of America.**

Noon—Luncheon as guests of Alcoa.

Friday, Sept. 28—Pittsburgh, Pa.

Visit to **Mellon Institute of Industrial Research.**

12:15 P.M.—Lunch at University Grill.

1:30 P.M.—Visit to **U. S. Bureau of Mines.**

Saturday, Sept. 29—Cleveland, Ohio

3:00 P.M.—"Welcome to Sunnimoor Farm", summer home of W. H. Eisenman, A.S.M. national secretary.

Sunday, Sept. 30—Cleveland, Ohio

No formal program.

Monday, Oct. 1—Cleveland, Ohio

Visit to **Nela Park, General Electric Co.**

Tuesday, Oct. 2—Cleveland, Ohio

Visit to **Case Institute of Technology.**

11:45 A.M.—Complimentary Luncheon at University Club.

1:45 P.M.—Visit to **A.S.M. Headquarters.**

Wednesday, Oct. 3—Columbus, Ohio

Visit to **Battelle Memorial Institute.**

Noon—Lunch at Institute's Cafeteria.

Thursday, Oct. 4—Chicago, Ill.

Visit to **International Harvester Co.,** Manufacturing Research.

Noon—Luncheon as guests of the company.

Friday, Oct. 5—Chicago, Ill.

Visit to **Institute for the Study of Metals, University of Chicago.**

Noon—Luncheon as guests of the Institute.

Saturday, Oct. 6—Chicago, Ill.

No formal program.

Sunday, Oct. 7—Detroit, Mich.

No formal program.

Monday, Oct. 8—Detroit, Mich.

Visit to Research Department, **Chrysler Corp.**

Noon—Luncheon as guests of Chrysler Corp.

6:30 P.M.—Regular monthly meeting of Detroit Chapter A.S.M. (See "Special Events in Detroit, World Metallurgical Congress," page 28A.)

Tuesday, Oct. 9—Ann Arbor, Mich.

Visit to **University of Michigan.**

Noon—Lunch at Michigan Union Bldg.

Wednesday, Oct. 10—Bay City and Midland, Mich.

Visit to **Dow Chemical Co.,** Midland.

12:30 P.M.—Luncheon at Midland Country Club as guests of Dow Chemical Co.

1:45 P.M.—Visit to Research Laboratory of Dow Chemical Co.

Thursday, Oct. 11—Detroit, Mich.

Visit to Research Laboratory of **General Motors Corp.**

Noon—Luncheon as guests of General Motors Corp.

Friday, Oct. 12—Detroit, Mich.

9:30 A.M. and 2:00 P.M.—Meetings at Tuller Hotel to consolidate reports.

Saturday through Monday, Oct. 13-22

See "Special Events in Detroit—World Metallurgical Congress," page 28A.

Names, Booth Numbers, and Principal Products of

METAL SHOW EXHIBITORS

Michigan State Fair Grounds, Detroit, Oct. 15-19, 1951

A & B Centerless Grinding Co., Detroit. Booth A115. Ground and polished tubing and shafting.

A.B.C. Die Casting Machine Co., Chicago. Booth G127. Die casting and die-casting machinery.

Acetogen Gas Co., Detroit. Booth A215. Cutting gases.

Acme Manufacturing Co., Detroit. Booth D103. Grinding, polishing, buffing and deburring machines. Automatic welding positioners and work-holding machines.

Acme Steel Co., Chicago. Booth C221. Metal stitchers and production-stitched samples.

Acme Tool Co., New York. Booth A205. Surface plates; parallels; straight edges; toolholders.

Adamas Carbide Corp., Harrison, N. J. Booth H218. Tungsten carbide tool tips, dies, wear parts and powder.

Ajusto Equipment Co., Toledo, Ohio. Booth H147. Laboratory and plant furniture.

Air-Flo Compressor Co., Akron, Ohio. Booth H219. Air compressors.

Ajax Electric Co. Inc., Philadelphia. Booth F421. Salt bath brazing and heat treating.

Ajax Electrothermic Corp., Trenton, N. J. Booth F421. Electric induction furnaces for melting, forging, and heating applications.

Ajax Engineering Corp., Trenton, N. J. Booth F421. Electric induction melting furnaces.

Aktiebolaget Kanthal. Booth G352. (See Kanthal Corp.)

Allegheny Ludlum Steel Corp. Booth G459. (See Scovill Mfg. Co.)

Allied Products Corp., Detroit. Booth F302. Bolts, dies, jigs and fixtures, precision screw machine parts.

Allison Co., Bridgeport, Conn. Booth H431. Abrasive cutting wheels.

Alloy Engineering & Casting Co., Champaign, Ill. Booth B107. Heat resistant and stainless steel castings and furnace parts.

Alox Corp., Niagara Falls, N. Y. Booth C112. Lubricating oil additives for reducing friction, preventing rust, etc.

Alvey-Ferguson Co., Cincinnati, Ohio. Booth H502. Parts washing machines; conveyer systems.

American Brake Block Div. Booth F339. (See American Brake Shoe Co.)

American Brake Shoe Co., New York City. Booth F339. Heat and corrosion resistant castings; cast iron.

American Chain & Cable Co., Bridgeport, Conn. Booth A342. (See Campbell Machine Division and Wilson Mechanical Instrument Co.)

American Cyanamid Co., New York City. Booth G452. Salt bath heat treating supplies; ladle additions for steel.

American Gas Association, New York City. Booth G160. Industrial gas applications.

American Gas Furnace Co., Elizabeth, N. J. Booth G154. Gas furnaces and burners.

American Machine & Metals, Inc., East Moline, Ill. Booth B246. (See Riehle Testing Machines Div.)

American Machinist. Booth G256. (See McGraw-Hill Publishing Co.)

American Manganese Steel Div. Booth G339. (See American Brake Shoe Co.)

American Metals Co., Ltd. Booth G459. (See Scovill Mfg. Co.)

American Metal Market, New York City. Booth C110. Specimen copies of *American Metal Market,* daily newspaper of the metal trade.

American Optical Co., Instrument Division, Buffalo, N. Y. Booth B128. Scientific instruments; microscopes; comparators.

American Platinum Works, Newark, N. J. Booth G240. Silver brazing products and methods.

American Pullmax Co., Inc., Chicago. Booth A249. Sheet metal and plate cutting machinery.

American Silver Co., Inc., Flushing, L. I. Booth D129. Silver solders; precious metals.

American Society of Tool Engineers, Detroit. Booth H245. Technical and educational publications and information.

American Society for Metals, Cleveland. Booth H323. Technical books and magazines; educational services.

American Society for Metals, Detroit Chapter. Booth H420. Educational and technical activities.

Show Will Be Open

Mon., Tues., Wed., Oct. 15, 16, 17

12:00 Noon until 10:30 P.M.

Thurs. and Fri., Oct. 18, 19

10:00 A.M. until 6:00 P.M.

American Wheelabrator & Equipment Corp., Mishawaka, Ind. Booth F439. Blast cleaning machines; shot peening equipment; dust collectors.

Ames Precision Machine Works, Waltham, Mass. Booth A152. Hardness testers.

Amplex Mfg. Co., Detroit. Booth G416. Powder metal parts; oilless bearings.

Anchor Drawn Steel Co. Booth D345. (See Vanadium-Alloys Steel Co.)

Anderson Brothers Mfg. Co., Rockford, Ill. Booth H351. Hydraulic presses.

Anderson Oil Co., F. E., Portland, Conn. Booth F255. Metalworking fluids, rust preventives.

Angier Corp., Framingham, Mass. Booth G139. Rust preventive wrappings.

Applied Research Laboratories, Glendale, Calif. Booth G121. Spectrochemical equipment.

Arcos Corp., Philadelphia. Booth F457. Arc welding electrodes; oxy-arc cutting process.

Aronson Machine Co., Arcade, N. Y. Booth C127. Positioners and turning rolls.

Ashdee Products, Inc., Homewood, Ill. Booth G361. Paint spray equipment and products.

Ashworth Brothers, Inc., Worcester, Mass. Booth D140. Metal conveyer belts.

Atlas Press Co., Kalamazoo, Mich. Booth A241. Lathes, drills, shapers.

Aurora Metal Co., Aurora, Ill. Booth C215. Die castings.

Austenal Laboratories, Inc., New York City. Booth B142. Microcastings, made in high-temperature alloys, low alloys, S.A.E. steels and toolsteels.

Automotive Industries, Philadelphia. Booth A256. Editorial material.

Avon Tube Division, Higbie Mfg. Co., Rochester, Mich. Booth C237. Tube fabricating and bending, welded steel tubing.

B

Babcock & Wilcox Tube Co., New York City. Booth F314. Welded and seamless steel tubing.

Baird Associates, Inc., Cambridge, Mass. Booth H427. Laboratory instruments, spectrographs, gas analyzers.

Bakelite Division, Union Carbide & Carbon Corp., New York. Booth F322. Plastics and molding materials.

Baker & Co., Inc., Newark, N. J. Booth A363. Industrial and laboratory furnaces; laboratory ware, electrical contacts.

Baldwin-Lima-Hamilton Corp., Philadelphia. Booth D311. Metalworking presses; universal testing machines; tensile, fatigue, and impact machines; strain gages.

Banner Manufacturing Co., Milwaukee. Booth H302. Welding and brazing equipment.

Bausch & Lomb Optical Co., Rochester, N. Y. Booth B102. Microscopes and metallographic equipment; spectrographic accessories.

Bell & Gossett Co., Morton Grove, Ill. Booth A308. Pumps; heat exchangers.

Bernard Welding Equipment Co., Chicago. Booth H220. Weld cleaning hammer; electrode holders; welding clamps.

Blakeslee & Co., Cicero, Ill. Booth A250. Metal washers and degreasers.

Boice-Crane Co., Toledo. Booth A141. Drilling, tapping and woodworking machinery.

Bowser, Inc., Fort Wayne, Ind. Booth A209. Equipment for mixing and proportioning soluble and cutting oil, and for filtration and reclamation for such lubricants.

Brainard Steel Co., Warren, Ohio. Booth G151. Steel strapping, strapping tools and accessories.

Brown-Hutchinson Iron Works, Detroit. Booth A149. Steel structural work.

Bruce Products Corp., Detroit. Booth H223. Buffing and polishing wheels; metal finishing materials.

Bruning Co., Inc., Charles, Chicago. Booth F426. Printing, developing and drafting equipment.

Brush Development Co., Cleveland. Booth B147. Surface analyzers; strain analyzers, contour analyzers.

Buck Tool Co., Kalamazoo, Mich. Booth C224. Chucks.

Budd Corp., Charles, New Rochelle, N. Y. Booth H116. Safety hammers and machinists tools.

Buehler, Ltd., Chicago. Booth B131. Sample preparation equipment for the metallurgical laboratory; microtesting machines; optical equipment.

Bundy Tubing Co., Detroit. Booth D202. Tubing.

C

Cadillac Stamp Co., Detroit. Booth H258. Dies; stamps; badges; marking and numbering machinery.

Cambridge Wire Cloth Co., Cambridge, Md. Booth C111. Wire screen, cloth and belting.

Cam-Lok Division. Booth H520. See Empire Products, Inc.

Campbell Machine Division, American Chain & Cable Co., Inc., Bridgeport, Conn. Booth A342. Abrasive cut-off machines.

Carboloy Dept., General Electric Co., Detroit. Booth F214. Cemented carbide tools, dies and wear parts.

Casting Engineers, Inc., Chicago. Booth H324. Precision investment castings.

Chicago Metal Hose Corp., Maywood, Ill. Booth C218. Flexible metal tubing and hose; expansion joints.

Chicago Rivet & Machine Co., Bellwood, Ill. Booth G214. Automatic rivet setters.

Chicago Tramrail Corp., Chicago. Booth H215. Cranes, hoists, monorail systems.

Chilton Co., Inc. Booths A256 and A138. (See *Iron Age* and *Automotive Industries*)

Chrysler Corp. Booth G416. (See Amplex Manufacturing Co.)

Cincinnati Milling Machine Co., Cincinnati. Booth G356. Flame hardening machine; machine tools.

Cities Service Oil Co., New York City. Booth D210. Cutting and grinding oils; drawing compounds; greases; rust preventives.

Clark Instrument Co., Dearborn, Mich. Booth B143. Hardness testers.

Climax Molybdenum Co., New York City. Booth D250. Molybdenum and molybdenum alloys.

Clinton Machine Co., Warner Division, Detroit. Booth H546. (See Warner Division)

Coast Metals, Inc., Little Ferry, N. J. Booth H426. Hard facing welding rods; castings for abrasion resistance.

Coles Cranes, Inc., Chicago. Booth F307. Mobile cranes.

Colonial Steel Division. Booth D345. (See Vanadium-Alloys Steel Co.)

Commander Mfg. Co., Chicago. Booth A159. Drills and chip breakers.

Commercial Shearing & Stamping Co., Youngstown, Ohio. Booth D321. Pressed metal products; hydraulic hoist equipment.

Commercial Steel Treating Corp., Detroit. Booth D310. Commercial heat treating.

Composite Die Supply Co., Detroit. Booth D112. Engraving and die supplies including die pattern molds, etc.

Congres International des Fabrications Mecaniques, Stockholm, Sweden. Booth H519.

Continental Industrial Engineers, Inc., Chicago. Booth H345. Industrial furnaces; special machines; production lines; complete plants including buildings and all equipment.

Continuous Metalcast Corp. Booth G459. (See Scovill Mfg. Co.)

Crane Packing Co., Chicago. Booth D242. Lapping machines, tube rolling control; packings, mechanical seals; pipe joint and gasket compounds.

Cro-Plate Co., Inc., Hartford, Conn. Booth G122. Plating, cleaning, and surface finishing equipment and processes.

Crucible Steel Co. of America, New York City. Booth G310. High speed toolsteel; alloy, stainless and special purpose steels.

Dake Engine Co., Grand Haven, Mich. Booth F416. Hydraulic industrial presses.

Deepfreeze Distributing Corp., Cincinnati, Ohio. Booth H254. Low-temperature equipment.

Delaware Tool Steel Corp., Wilmington, Del. Booth C211. Controlled atmosphere furnace.

Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee. Booth A319. Metalworking and woodworking machine tools; spot and arc welders; lathes.

Detrex Corp., Detroit. Booth G351. Cleaning and degreasing equipment; cleaning compounds, and solvents.

Detroit Edison Co., Detroit. Booth F461. Public utilities.

Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich. Booth A260. Electric melting furnaces.

Detroit Testing Machine Co., Detroit. Booth B127. Tensile and ductility testers; Brinell machines.

Diamond Iron Works, Inc. Booth H236. (See Mahr Mfg. Co.)

Die Casting. Booth G440. (See *Industry & Welding*)

Dietert Co., Harry W., Detroit. Booth B244. Carbon and sulphur determination equipment; Brinell reader; sand, core, and mold testing equipment for the foundry.

Distillation Products Industries, Division of Eastman Kodak Co., Rochester, N. Y. Booth D236. Vacuum systems and furnaces; pumps; gages.

Diversey Corp., Chicago. Booth G346. Metal cleaning compounds.

Diversified Metal Products Co., Los Angeles, Calif. Booth H224. Machine tools and equipment.

DoAll Co., Des Plaines, Ill. Booth H305. Sawing, filing, and grinding equipment; gages, chucks, automatic selecting equipment.

Dow Chemical Co., Midland, Mich. Booth F222. Magnesium; magnesium alloy products.

Dow Furnace Co., Detroit. Booth A349. Controlled atmosphere furnaces, gas cyaniding.

Drever Co., Philadelphia. Booth C229. Industrial metal treating furnaces; ammonia dissociators and other atmospheric equipment.

Driver Co., Wilbur B., Newark, N. J. Booth A305. Electrical resistance alloys in rod, wire and strip form.

Du Pont de Nemours & Co., E. I., Wilmington, Del. Booth F356. Electroplating and surface finishing equipment; chemicals and supplies.

E

Eastman Kodak Co. Booth D236. (See Distillation Products Ind. Div.)

East Shore Machine Co., Cleveland. Booth H111. Keyway broaches.

Eaton Mfg. Co., Reliance Division, Massillon, Ohio. Booth H357. Spring lock washers; cold finished steel.

Eclipse Fuel Engineering Co., Rockford, Ill. Booth G162. Gas burners; air-gas mixers; valves; pressed steel pots; furnaces and boilers.

Elastic Stop Nut Corp. of America, Union, N. J. Booth D223. Stop nuts and self-locking fasteners.

Eldorado Mining & Refining Ltd., Ottawa, Canada. Booth H118. Radiography sources utilizing radium and cobalt-60. Remote control manipulators for handling radioactive materials. Radioactive isotopes.

Electric Furnace Co., Salem, Ohio. Booth F405. Gas-fired, oil-fired and electric heat treating furnaces; controlled atmosphere equipment.

Electric Products Co., Cleveland. Booth H202. Motor generators and special electric equipment.

Electro-Alloys Div. Booth F339. (See American Brake Shoe Co.)

Electro-Arc-Mfg. Co., Detroit. Booth H508. Electrical tap extractor and driller.

Elgin National Watch Co., Industrial Products Div., Elgin, Ill. Booth H235. Abrasive diamond products; sapphire products; spring alloy.

Elox Corp. of Michigan, Clawson, Mich. Booth G239. Tapping tools; tap extractor.

Empire Products Inc. Cincinnati, Ohio. Booth H520.

Engelhard Industries. Booths A363, A301 and G240. (See Baker & Co., D. E. Makepeace Co., American Platinum Works.)

Engineered Castings Div. Booth F339. (See American Brake Shoe Co.)

Engis Equipment Co., Chicago. Booth B223. Instruments and diamond compounds.

Ercona Corp., New York City. Booth B243. Scientific instruments.

Erico Products, Inc., Cleveland. Booth H158. Cable splicing processes.

Eutectic Welding Alloys Corp., New York City. Booth F403. Welding rods and electrodes.

F

Fahralloy Co., Harvey, Ill. Booth H151. Stainless steel and heat resistant castings.

Fawick Airflex Co., Inc., Cleveland. Booth G251. Industrial clutches and seals; valves; brakes.

Ferner Co., Inc., R. Y., Boston, Mass. Booth B218. Fatigue testing machine; metallurgical microscopes; portable hardness testers.

Firth Sterling Steel & Carbide Corp., Pittsburgh. Booth G446. Tool and stainless steels; sintered carbides; carbide-tipped tools.

Fiske Brothers Refining Co., Lubriplate Division, Newark, N. J. Booth C232. Oils and greases; cutting compounds.

Flow. Booth G440. (See Industrial Publishing Co.)

Foerster Institut, Wurttemberg, Germany. Booth B136. (See Institut Dr. Foerster.)

Freedom-Valvoline Oil Co., Freedom, Pa. Booth H244. Lubricating oils and greases; rust preventives.

Frontier Bronze Corp., Niagara Falls, N. Y. Booth B203. Bronze, aluminum and monel sand castings; aluminum alloy tubing and extrusions.

G

Galileo Corporation of America, Inc. Booth B138. (See Opplem Co.)

Gas Appliance Service, Inc., Chicago. Booth G158. Gas-air mixers; high speed burners; small furnaces; air heaters.

Gehringer & Forsyth, Detroit. Booth D140. Sales & service engineers for metal industry. (See also Standard Alloy Co., Rolock, Inc., and Ashworth Bros., Inc.)

General Alloys Co., Boston. Booth A336. Heat resisting alloy castings and furnace mechanisms; stainless steel castings.

General Aniline & Film Corp. Booth G451. (See Ozalid Div.)

General Controls Co., Glendale, Calif. Booth G164. Automatic temperature, pressure and level controls.

General Electric Co., Schenectady, N. Y. Booth A102. Testing and inspection equipment; welding equipment; furnaces.

General Electric X-Ray Corp., Milwaukee. Booth F250. X-ray and radiographic equipment.

General Plate Co. Booth D109. (See Metals & Controls Corp.)

Goodrich Co., B. F., Akron, Ohio. Booth C212. Rivnut blind fasteners.

Gordon Co., Claud S., Chicago. Booth H352. Heat treating furnaces; temperature indicating and control instruments.

Graham Mfg. Corp., Ferndale, Mich. Booth H257. Stud welders and contract welding.

Gray-Grimes Tool Co., Detroit. Booth H154. Boring chucks, machine tool accessories and fittings.

Gulf Oil Corp., Pittsburgh. Booth D230. Petroleum products—lubricants, cutting and quenching oils.

H

H & H Research Co., Detroit. Booth A205. Reciprocating action tools and accessories; surface plates, toolholders.

H & H Tube & Mfg. Co., Detroit. Booth D314. Seamless brass and copper tubing; lockseam tubing; strip.

Hammond Machinery Builders, Inc., Kalamazoo, Mich. Booth F211. Polishing, buffing and grinding equipment.

Hanchett Magna-Lock Corp., Big Rapids, Mich. Booth H120. Magnetic chucks and devices.

Handy & Harman, New York City. Booth F315. Silver brazing by induction heat and torch.

Harnischfeger Corp., Milwaukee. Booth G415. Arc welders; positioners; materials handling equipment.

Harper Electric Furnace Corp., Niagara Falls, N. Y. Booth C204. High-temperature electric furnaces.

Harshaw Chemical Co., Cleveland. Booth A220. Plating and finishing supplies; chemicals.

Haynes Stellite Co. Booth F440. (See Union Carbide & Carbon Corp.)

Heintz Mfg. Co., Detroit. Booth A339. Auto bodies; metal pressing and stampings.

Heli-Coil Corp., Danbury, Conn. Booth A154. Heli-Coil inserts for protecting and strengthening screw threads.

Heppenstall Co., Pittsburgh. Booth C122. Forgings; shear knives; die blocks.

Hevi Duty Electric Co., Milwaukee. Booth D350. Electric industrial and laboratory furnaces.

Higbie Manufacturing Co. Booth C237. (See Avon Tube Div.)

Hilger, Ltd., Adam. Booth B146. (See Jarrell-Ash Co.)

Hitchiner Manufacturing Co. Booth H264. (See Metal Products Sales Co.)

Hobart Brothers Co., Troy, Ohio. Booth D138. Electric arc welding equipment.

Holcroft & Co., Detroit. Booth G245. Heat treating equipment and supplies.

Holden Co., A. F., Detroit. Booth F406. Salt baths; heat treating furnaces.

Hones, Inc., Charles A., Baldwin, L. I., N. Y. Booth G265. Gas-fired oven furnaces; burners.

Hoskins Manufacturing Co., Detroit. Booth F217. Resistance wire; special alloys; electric heat treating furnaces.

Houghton & Co., E. F., Philadelphia. Booth F306. Cutting oils, heat treating compounds; metal cleaners.

Howard Foundry Co., Chicago. Booth C138. Castings, sand and permanent mold, of aluminum, brass, bronze, magnesium. and semi-steel.

I

Illinois Testing Laboratories, Inc., Chicago. Booth B224. Temperature, air and dew point measuring instruments.

Industrial Cable & Sling Co., Detroit. Booth H251. Wire-rope and chain fittings.

Industrial Heating. Booth C239. (See National Industrial Publishing Co.)

Industrial Gas Div. Booth D114. (See Liquid Carbonic Corp.)

Industrial Heating Equipment Co., Detroit. Booth D320. Burners; heat treating furnaces.

Industrial Press, New York City. Booth H128. Trade papers and engineering data.

Industrial Publishing Co., Cleveland. Booth G440. Publications—*Industry and Welding; Die Castings; Flow; Applied Hydraulics.*

Industry and Welding, Cleveland. Booth G440. (See Industrial Publishing Co.)

Institut Dr. Foerster, Wurtemburg, Germany. Booth B136. Equipment for nondestructive and electronic testing.

International Nickel Co., Inc., New York City. Booth A328. Nickel and nickel alloys; nickel steel and cast iron; stainless steels.

Invincible Vacuum Cleaner Mfg. Co., Dover, Ohio. Booth H123. Welding flux recovery equipment.

Ipsen Industries, Inc., Rockford, Ill. Booth F360. Automatic heat treating units; generators.

Iron Age, New York City. Booth A138. Magazines and reprints.

J

Janney Cylinder Co., Philadelphia. Booth G315. Finish-machined products made from centrifugal castings of ferrous and nonferrous alloys.

Jarrell-Ash Co., Boston. Booth B111. Precision scientific apparatus.

Jelliff Mfg. Corp., C. D., Southport, Conn. Booth G352. (See Kanthal Corp.)

Jensen Specialties, Inc., Detroit. Booth D215. Electric ovens.

Johansson Gage Co., C. E., Detroit. Booth B226. Gage blocks.

Johnson & Son, Inc., S. C., Racine, Wis. Booth G316. Protective wax coatings for metals.

Jones Co., C. Walker, Philadelphia. Booth A145. Industrial work gloves.

K

K. S. M. Products, Inc., Stud Welding Division, Merchantville, N. J. Booth G321. Equipment for stud welding process.

Kalamazoo Tank & Silo Co., Kalamazoo, Mich. Booth F416. (See Marvin Machine Products Co.)

Kanthal Corp., Southport, Conn. Booth G352. Electric resistance wire; high-temperature alloys. Heating elements and resistance alloys.

Kearney & Trecker Corp. Booth A240. (See Walker-Turner Div.)

Kelite Products, Inc., Los Angeles. Booth H253. Metal cleaning materials.

Kemp Mfg. Co., C. M., Baltimore, Md. Booth G144. Industrial gas carburetors; gas burners; immersion heating.

Kennametal, Inc., Latrobe, Pa. Booth G252. Metal cutting tools; wear resistant parts.

Kentucky Agriculture & Industrial Development Board, Frankfort, Ky. Booth H155. Industrial Development of Kentucky.

Kerns Co., L. R., Chicago. Booth A119. Industrial lubricants.

Keuffel and Esser Co., Detroit. Booth H206. Copying, reproducing and drafting equipment and supplies.

King, Andrew, Narberth, Pa. Booth B122. Portable Brinell hardness tester.

Kold-Hold Manufacturing Co., Lansing, Mich. Booth G345. Platecoils which replace pipe coils for heating or cooling tanks.

Kolene Corp., Detroit. Booth A315. Cleaning process for removal of oxide scale and other impurities at the surface of metals.

Kropp Forge Co., Chicago. Booth D222. Flat die, drop forge and upset forgings.

Kuhlman Electric Co. Booth A260. (See Detroit Electric Furnace Div.)

Kux Machine Co., Chicago. Booth A122. Die-casting machines; powder metal presses.

L

Laboratory Equipment Corp., St. Joseph, Mich. Booth B247. Carbon and sulphur determination equipment; laboratory furnaces and equipment.

Lake Shore Engineering Co., Iron Mountain, Mich. Booth B134. Special industrial machinery and hoists.

Lapeer Mfg. Co., Detroit. Booth H157. Clamps and pliers.

Last Word Sales Co., Detroit. Booth H154. (See Gray-Grimes Co.)

Leeds & Northrup Co., Philadelphia. Booth F351. Temperature recorders and controllers; heat treating furnaces.

Leitz, Inc., E., New York City. Booth B211. Microscopes.

Lepel High Frequency Laboratories, Inc., New York City. Booth G145. High-frequency induction heating equipment.

Lincoln Electric Co., Cleveland. Booth F348. Arc welding equipment and supplies.

Lindberg Engineering Co., Chicago. Booth F340. Heat treating furnaces; blowers; hydraulic equipment.

Liquid Carbonic Corp., Chicago. Booth D114. Gas welding and cutting equipment.

Livingstone Engineering Co., Worcester, Mass. Booth B228. Steam-jet cleaner for floors, walls and machinery.

Loftus Engineering Corp., Pittsburgh. Booth G125. Industrial furnaces and plants.

Los Angeles Chamber of Commerce. Booth G215. (See Los Angeles Dept. of Water & Power)

Los Angeles Dept. of Water & Power, Los Angeles. Booth G215. Industrial Development of Los Angeles.

Lubriplate Division. Booth C232. (See Fiske Bros. Refining Co.)

Lynchburg Foundry Co., Lynchburg, Va. Booth D337. Cast iron pipe and fittings.

M

Machinery, New York City. Booth H128. (See Industrial Press.)

Magnaflux Corp., Chicago. Booth G339 & G230. Magnetic flaw detection equipment; thickness gage; automatic punch press loader.

Magnethermic Corp., Youngstown, Ohio. Booth G234. Induction heating equipment.

Magnetic Analysis Corp., New York City. Booth B231. Magnetic inspection equipment; comparators.

Mahr Manufacturing Co. Div., Diamond Iron Works, Inc., Minneapolis. Booth B236. Heat treating furnaces.

Makepeace Co., D. E., Attleboro, Mass. Booth A301. Gold, silver and gold-filled sheet, wire and tubing.

Manufacturers Processing Co., Detroit. Booth H110. Degreasing equipment.

Martindale Electric Co., Cleveland. Booth C201. Grinding and filing equipment; saws; dust masks.

Marvin Machine Products, Inc., Detroit. Booth F416. Small milling machines.

Master Builders Co., Cleveland. Booth C131. Industrial floors and heavy equipment grouts.

McGraw-Hill Publishing Co., Inc., New York City. Booth G265. Publications—*American Machinist; Product Engineering; Welding Engineer;* books.

Mechanical Air Controls, Inc., Royal Oak, Mich. Booth H340. Air-operated and electrically operated control valves.

Mechanics Laundry Co., Detroit. Booth D303. (See Ohio Overall Cleaning Co.)

Merrill Bros., Maspeth, N. Y. Booth C134. Material handling devices.

Metal Products Sales Co., West Hartford, Conn. Booth H264. Precision investment castings; die castings.

Metal Progress. Booth H323. (See American Society for Metals.)

Metal Removal Co., Chicago. Booth H126. Die and mold finishing specialties. Tool bits and blanks, end mills, etc.

Metals & Controls Corp., Attleboro, Mass. Booth D109. Temperature control devices.

Metals Finishing Corp., Hazel Park, Mich. Booth H526.

Metals Review. Booth H323. (See American Society for Metals.)

Michiana Products Corp., Michigan City, Ind. Booth A312. Stainless, heat resistant and abrasion resistant castings.

Michigan Industrial Gas Corp., Detroit. Booth H210. Industrial gases.

Michigan Bell Telephone Co., Detroit. Booth F401. Utilities.

Michigan Steel Casting Co., Detroit. Booth G409. Stainless steel and heat resisting alloy castings.

Microcast Division. Booth B142. (See Austenal Laboratories, Inc.)

Miller & Taylor Tool Co., Cleveland. Booth G456. Die casting machines.

Milne & Co., A., New York City. Booth A356. Hollow die steel and graphitic toolsteels.

Mir-O-Col Alloy Co., Inc., Los Angeles. Booth A316. Hard facing alloys.

Modernair Corp., San Leandro, Calif. Booth H315. Cylinders and control valves for air power. Pneumatic and hydraulic devices.

Morton Gregory Corp. Booth G202. (See Nelson Stud Welding Division.)

Mueller Brass Co., Port Huron, Mich. Booth H241. Brass and copper products; rods, tubing, extruded shapes; bronze bearings, forgings, screw machine products.

Multifinish Manufacturing Co., Detroit. Booth H247. Magnetic devices; separating and lifting magnets.

N

National Carbon Division, Union Carbide & Carbon Co., New York. Booth F440. Carbon and graphite refractories, electrodes, pipe and fittings.

National Cored Forgings Co., Inc., South Norwalk, Conn. Booth F254. Cored nonferrous forgings.

National Cylinder Gas Co., Chicago. Booth G112. Industrial gases; welding and cutting equipment.

National Diamond Laboratory, New York City. Booth C210. Industrial diamond tools.

National Industrial Publishing Co., Pittsburgh. Booth C239. Copies of magazine *Industrial Heating.*

National Lead Co., New York City. Booth F449. Kirksite dies; solders and fluxes; babbitt metals.

National Radiator Co., Johnstown, Pa. Booth H109. (See Plastic Metals Division.)

National Research Corp., Cambridge, Mass. Booth A309. Vacuum-cast metals; high-vacuum furnaces and equipment.

National Spectrographic Laboratories, Cleveland. Booth B146. (See Jarrell-Ash Co.)

National Time & Signal Corp., Detroit. Booth B238. Timing devices and industrial process controls.

National Torch Tip Co., Pittsburgh. Booth H148. Welding supplies.

Nelson Stud Welding Division, Morton Gregory Corp., Lorain, Ohio. Booth G202. Stud welding equipment.

New Hermes Engraving Machine Corp., New York City. Booth H108. Portable machines for engraving on metal or plastics.

New Jersey Zinc Co., New York City. Booth A162. Zinc die castings and finished products.

Niagara Blower Co., New York City. Booth G422. Heat exchangers for quench oil and compressed air cooling; subfreezing systems; high-pressure heaters.

North American Philips Co., Inc. Booth A220. (See Harshaw Chemical Co.)

Nox-Rust Chemical Corp., Chicago. Booth H417. Rust-inhibited wrapper for packaging of metal parts; rust-preventive compounds.

O

Oakite Products, Inc., New York City. Booth D309. Cleaning compounds and materials.

Office Technique Pour L'Utilisation De L'Acier, Paris, France. Booth H521. French steel industry.

Ohio Crankshaft Co., Cleveland. Booth G246. High-frequency induction heating equipment.

Ohio Overall Cleaning Co., Cleveland. Booth D303. Shop and factory supplies.

Olsen Testing Machine Co., Tinius, Willow Grove, Pa. Booth D216. Universal testing machines.

Opplem Co., Inc., New York City. Booth B138. Optical, engineering and surveying instruments.

Osborn Mfg. Co., Cleveland. Booth D118. Power and hand brushes.

Ozalid Division, General Aniline & Film Corp., Johnson City, N. Y. Booth G451. Print-making equipment; copying techniques.

P

Pangborn Corp., Hagerstown, Md. Booth G421. Blast cleaning machines.

Park Chemical Co., Detroit. Booth F456. Heat treating materials.

Parker Rust Proof Co., Detroit. Booth H339. Rustproofing materials.

Peabody Industries, Highland Park, Mich. Booth H214. Hardness testers.

Penton Publishing Co., Cleveland. Booth G340. Publications: *Steel; Foundry; Machine Design; New Equipment Digest;* technical books.

Peters-Dalton Inc., Detroit. Booth G355. Dust collectors; spray booths.

Phillips Manufacturing Co., Chicago. Booth A355. Vapor degreasers.

Physicists Research Co., Ann Arbor, Mich. Booth D135. Surface analysis equipment.

Picker X-Ray Corp., New York City. Booth F411. X-ray apparatus and accessories.

Platecoil Division, Kold-Hold Mfg. Co., Lansing, Mich. Booth G345. (See Kold-Hold Mfg. Co.)

Powdered Metal Products Corp. of America, Franklin Park, Ill. Booth A118. Structural parts made by the powdered metal process.

Power Ball Oil Co., Detroit. Booth A105. Friction proof oils, compounds and materials.

Precision Metalsmiths, Inc., Cleveland. Booth B123. Precision castings.

Precision Spring Corp., Detroit. Booth A214. Steel springs.

Precision Welder & Machine Co., Cincinnati. Booth H364. Spot welding equipment.

Product Engineering. Booth G256. (See McGraw-Hill Publishing Co.)

Product Engineering & Mfg. Corp., Bridgman, Mich. Booth H221. Die castings; dies; stampings; fixtures; gages.

Production Machine Co., Greenfield, Mass. Booth F225. Polishing, buffing and deburring machines.

Pyrometer Instrument Co., Inc., Bergenfield, N. J. Booth B108. Optical, radiation, surface and immersion pyrometers.

R

RCA Victor Division. Booth D324. (See Radio Corp. of America)

R. C. S. Tool Sales Corp., Joliet, Ill. Booth H316. Portable electric power saws.

Radio Corp. of America, Camden, N. J. Booth D324. Electronic power generators for high-frequency soldering, brazing, heat treating; electron microscopes.

Ransburg Electro-Coating Corp., Indianapolis, Ind. Booth G445. Electrostatic detearing and spray finishing processes.

Rapids-Standard Co. Inc., Grand Rapids, Mich. Booth H121. Materials handling equipment; conveyers.

Raytheon Manufacturing Co., Waltham, Mass. Booth A255. Welding head; power supplies; resistance welding control.

Ready-Power Co., Detroit. Booth G131. Generator sets; power units for industrial tractors and trucks; cooling units.

Reeves Pulley Co., Columbus, Ind. Booth A350. Variable speed control equipment.

Reliance Electric & Engineering Co., Cleveland. Booth A360. Electric motors, generators, speed drives.

Rem-Cru Titanium Co., Inc. Booth G310. (See Crucible Steel Co. of America.)

Reynolds Metals Co., Louisville, Ky. Booth F325. Aluminum alloys and fabricated parts.

Richard Brothers Div. Booth F302. (See Allied Products Co.)

Richards Co., J. A., Kalamazoo, Mich. Booth H152. Bending and cutting machines.

Riehle Testing Machines Division, American Machine and Metals, Inc., East Moline, Ill. Booth B246. Tensile, impact, hardness and other mechanical testing machines.

Robotron Corp., Detroit. Booth H535. Electronic control equipment.

Rockwell Mfg. Co., Milwaukee. Booth A319. (See Delta Power Tool Division.)

Rolock, Inc., Fairfield, Conn. Booth D140. Heat and cororsion resisting alloy equipment for heat treating and metal finishing.

Ross Operating Valve Co., Detroit. Booth B232. Compressed operat-

Rossi, Irving. Booth G459. (See Scovill Mfg. Co.)

S

S & S Machinery Co., Brooklyn, N. Y. Booth G330. Heavy machinery.

Safety Clothing & Equipment Co., Cleveland. Booth G462. Protective clothing and safety equipment.

Sales Service Machine Tool Co., St. Paul, Minn. Booth A219. Power presses; power hack saws.

Schenck, Carl, Darmstadt, Germany. Booth B218. (See R. Y. Ferner Co.)

Schrader's Son Div., A., Brooklyn. Booth G309. Pneumatic machine controls.

Sciaky Bros., Inc., Chicago. Booth G318. Resistance welding machines.

Scott & Son, Inc., C. U., Rock Island, Ill. Booth H243. Parts made of stainless steel and heat treated.

Scovill Mfg. Co., Inc., Waterbury, Conn. Booth G459. High speed brass rod.

Seal-Peel, Inc., Van Dyke, Mich. Booth A320. Resin coatings for metals.

Selas Corp. of America, Philadelphia. Booth G148. Heating furnaces and burners.

Sentry Co., Foxboro, Mass. Booth A109. Hardening furnace; tube combustion furnace; diamond blocks and accessories.

Service Diamond Tool Co., Ferndale, Mich. Booth G117. Industrial diamonds.

Sheldon Machine Co., Inc., Chicago. Booth A155. Lathes, milling machines and shapers.

Sherman & Co. Booth D129. (See American Silver Co., Inc.)

Sinclair Refining Co., Chicago. Booth H358. Industrial lubricants; cutting oils, drawing compounds, industrial greases.

Smith Corp., A. O., Los Angeles. Booth H524.

Smith Welding Equipment Corp., Minneapolis. Booth A208. Welding torches, accessories and special purpose tips.

Socony-Vacuum Oil Co., Inc., New York City. Booth G221. Cutting and grinding oils; lubricants.

Solventol Chemical Products, Inc., Detroit. Booth A202. Cleaning compounds.

Sonoflux Corp., Houston, Texas. Booth H146. Magnetic particle inspection equipment.

Sparkler Mfg. Co., Mundelein, Ill. Booth A218. Industrial filters.

Special Libraries Association, Metals Section, New York City. Booth H424. Both American and foreign books and periodicals for the metallurgist. Library and reference service. Translations index.

Spencer Scientific Instruments. Booth B128. (See American Optical Co.)

Spencer Turbine Co., Hartford, Conn. Booth G260. Vacuum cleaning equipment; turbo compressors.

Sperry Corp., Booths G109 and D115. (See Vickers, Inc., and Sperry Products, Inc.)

Sperry Products, Inc., Danbury, Conn. Booth D115. Ultrasonic instruments for detection of flaws and measuring thickness.

Standard Alloy Co., Cleveland. Booth D140. Heat resisting furnace parts.

Standard American Engineering Co., Lyons, Ill. Booth D110. Combined radiation and convection heat treating furnace.

Standard Diemaker Supplies, Detroit. Booth H328. Diemaker supplies.

Standard Electrical Tool Co., Cincinnati. Booth G210. Grinding, buffing and polishing equipment.

Standard Oil Co. of Indiana, Chicago. Booth D130. Cutting oils; quenching oils; lubricants.

Standard Steel Treating Co., Detroit. Booth H139. Commercial heat treating.

Standard Tube Co., Detroit. Booth A216. Electric welded steel and stainless steel tubing; upset tubes and forgings; fabricated tubular parts.

Starrett Co., L. S., Athol, Mass. Booth C123. Mechanic's hand measuring tools and precision instruments; hacksaws and band saws.

Steel. Booth G340. (See Penton Publishing Co.)

Steel City Testing Machines, Inc., Detroit. Booth G220. Universal, tensile, hardness, ductility, compression, and special testing machines.

Stevens, Inc., Frederic B., Detroit. Booth D330. (See Udylite Corp.)

Stokes Machine Co., F. J., Philadelphia. Booth A158. Powder metal presses.

Stone Machinery Co., Inc., Syracuse, N. Y. Booth A359. Metal cut-off machines.

Stuart Oil Co., Ltd., D. A., Chicago. Booth A266. Cutting and grinding oils.

Sub Zero Products Mfg. Division. Booth H254. (See Deepfreeze Distributing Corp.)

Sunbeam Corp., Chicago. Booth F256. Industrial furnaces.

Surface Combustion Corp., Toledo. Booth F240. Heat treating furnaces and equipment.

Syntron Co., Homer City, Pa. Booth H135. Portable electric tools.

T

Tagliabue Instruments Div. Booth B227. (See Weston Electrical Instrument Corp.)

Tempil Corp., New York City. Booth C117. Temperature - indicating crayons, pellets and paint.

Tennant Co., G. H., Minneapolis. Booth H530. Floor cleaning and maintenance machines.

Texas Co., New York City. Booth C103. Cutting coolants and lubricants.

Tin Research Institute, Inc., Columbus, Ohio. Booth B236. Information on production, consumption, properties and applications of tin.

Tincher Products Co., Sycamore, Ill. Booth C228. Process for recovery of porous castings; products for repairing cracked engine blocks.

Tinnerman Products, Inc., Cleveland. Booth C207. Fasteners—Speednuts, Speedclips and Speedclamps.

Tocco Induction Heating Equip. Div. Booth G246. (See Ohio Crankshaft Co.)

Tool Engineer. Booth H245. (See American Society of Tool Engineers.)

Tracerlab, Inc., Boston. Booth B118. Radioactive instruments.

Trerice Co., H. O., Detroit. Booth B245. Thermometers; steam traps; air filters.

Trent Tube Co. Booth G310. (See Crucible Steel Co. of America.)

Tri-Clover Machine Co., Kenosha, Wis. Booth H346. Stainless steel fittings; pumps, valves and filters; stainless steel tubing; superspeed tools.

U

Uddeholm Company of America, Inc., New York City. Booth B116. Swedish steels; toolsteels.

Udylite Corp., Detroit. Booth D330. Plating and polishing equipment.

Union Carbide and Carbon Corp., New York City. Booth F440. (See Haynes Stellite Division, Linde Air Products Co., and National Carbon Division.)

United Chromium, Inc., New York City. Booth B132. Metal finishing and electroplating processes and materials.

U. S. Air Forces, Wright-Patterson Air Force Base, Dayton, Ohio. Booth H136. Materials research.

U. S. Electrical Motors, Inc., Los Angeles. Booth D302. Electrical motors and power drives.

U. S. Gypsum Co., Chicago. Booth H143. Construction materials.

Universal Castings Corp., Chicago. Booth G115. Plaster mold nonferrous castings.

Universal-Cyclops Steel Corp., Bridgeville, Pa. Booth F247. Toolsteels; stainless and special steels.

Univertical Machine Co., Detroit. Booth H348. Hand tools.

Upton Electric Furnace Co., Detroit. Booth C102. Furnaces and salt baths.

V

Vanadium-Alloys Steel Co., Latrobe, Pa. Booth D345. Toolsteels.

Vapofier Corp., Chicago. Booth C109. Gas generators.

Vickers, Inc., Detroit. Booth G109. Hydraulic pumps, valves, control and fluid meters.

Victor-Peninsular Div. Booth F302. (See Allied Products Co.)

Vlier Mfg. Co., Los Angeles. Booth B204. Torque thumb screws; spring plungers; spring stops; fixture keys.

Walder-Scott, Inc., Detroit. Booth G101.

Walker-Turner Division, Kearney & Trecker Corp., Plainfield, N. J. Booth A240. Machine tools.

Wall Colmonoy Corp., Detroit. Booth B243. Hard facing alloys.

Warner Division. Booth H546. (See Clinton Machine Co.)

Webber Appliance Co., Inc., Indianapolis, Ind. Booth H248. Furnaces.

Weldit, Inc., Detroit. Booth H545. Welding and cutting apparatus.

Wells & Sons, W. F., Three Rivers, Mich. Booth H117. Metal cutting machinery.

Wells Manufacturing Corp., Three Rivers, Mich. Booth D209. Metal cutting bandsaw machines.

Weltronic Co., Detroit. Booth G224. Electronic control equipment.

Western Sealant of Detroit, Inc., Detroit. Booth C118. Sealants for castings.

Westinghouse Electric Corp., Pittsburgh. Booth G430. Welding machines; high-frequency equipment; magnetic materials; pure metals.

Weston Electrical Instrument Corp., Newark, N. J. Booth B227. Electrical measuring instruments and appliances.

Wheelco Instruments Co., Chicago. Booth D219. Temperature measurement, recording and control instruments.

Wilson Carbon Co., New York City. Booth B220. Industrial carbon products.

Wilson Mechanical Instrument Co., New York City. Booth A342. Tukon and Rockwell hardness testers.

World Raw Materials Congress. (See Congrés International des Fabrications Mécaniques.)

Worthington Pump & Machinery Corp., Harrison, N. J. Booth G455. Welding and assembly positioning equipment.

Wynn Oil Co., Milford, Mich. Booth H124.

Zeiss, Inc., Carl. Booth B243. (See Ercona Corp.)

Again this year...

ADVANCE REGISTRATION FORM

We present the opportunity for you to make your advance registration for

DETROIT METAL SHOW

OCTOBER 15 THROUGH 19, 1951

MICHIGAN STATE FAIR GROUNDS

Just fill in the coupon below and mail prior to October 6 and your badge will be made and mailed to you BEFORE THE MEETING. With this advance badge you may enter immediately and avoid delay at the Registration Desks.

For your Hotel Reservations write direct to Housing Committee, Detroit Convention and Tourist Bureau, 626 Book Bldg., Detroit 26, Mich.

MAIL COUPON TO:

AMERICAN SOCIETY FOR METALS
1510 BOOK BLDG.
DETROIT 26, MICH.

SAVE TIME AND WAITING AT REGISTRATION DESK

★

FILL IN THIS COUPON AND MAIL TODAY

★

REGISTRATION CARD

MUST BE FILLED IN—COMPLETELY
PLEASE TYPE OR PRINT

[MAIL PRIOR TO OCTOBER 6 FOR BADGE OR PRESENT AT SHOW REGISTRATION DESK]

YOUR NAME _____ TITLE OR POSITION _____
PLEASE PRINT

COMPANY _____

ADDRESS _____
CITY STATE

ASM CHAPTER AFFILIATION _____

MAJOR PRODUCTS OR SERVICES OF YOUR PLANT _____

PLEASE CHECK DEPARTMENT IN WHICH YOU ARE EMPLOYED:

1) MANAGEMENT ☐ 3) ENGINEERING ☐ 5) PURCHASING ☐ 7) EDUCATION ☐
2) PRODUCTION ☐ 4) METALLURGY ☐ 6) SALES & ADV. ☐ 8) GOVERNMENT ☐
9) _____ OTHER

CHECK IF MEMBER OF FOLLOWING: ☐ ASM ☐ AWS ☐ SNDT ☐ AIME

• MAIL PRIOR TO OCTOBER 6 OR PRESENT AT REGISTRATION DESK FOR BADGE •

(Continued from Page 16)

The effect of ternary additions on the age-hardening of a copper-silver alloy. Results are not conclusive. (N7, Ag, Cu)

192-N. Anelastic Measurements of Diffusion Coefficients in F.C.C. Substitutional Solid Solutions. A. D. Le Claire. *Philosophical Magazine,* ser. 7, v. 42, July 1951, p. 673-688.

Shows how in face-centered cubic substitutional solid solutions of metals, measurements upon that form of anelasticity which is associated with the preferential reorientation of pairs of solute atoms in the presence of a tensile stress, may be used to obtain the diffusion coefficient of the solute atoms. Advantages and disadvantages of this method and some possible further developments of the theory. 15 ref. (N1, Q22, Cu)

193-N. Improvement of the Characteristics of Cast Iron by Modification of the Graphite. (In French.) *Métallurgie et la Construction Mécanique,* v. 83, May 1951, p. 351-355.

Acicular graphite is changed to the nodular form. Research was carried out by studying the liquefaction of the phase in which graphite is soluble, and the condition in which it precipitates. 17 photomicrographs. (N8, CI)

194-N. Theory of Grain Boundary Migration Rates. David Turnbull. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 661-665.

The relation between grain-boundary migration rates and diffusion coefficients is derived on the basis of the absolute reaction-rate theory. An explanation for the unexpectedly large entropy of activation in boundary-migration processes is given based on the concept that inclusions retarding boundary migration become less effective at elevated temperature due to their solution and coalescence. 32 ref. (Ni, P12)

195-N. Fundamental Aging Effects Influencing High-Temperature Properties of Solution-Treated Inconel X. D. N. Frey, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2385, June 1951, 71 pages.

Studies were made of the effects of various aging treatments on the mechanical properties of solution-treated Inconel X at 1200 and 1500° F. for rupture times of 0.1 to 1000 hr. Specimens were aged at 1200, 1400, and 1600° F° for time periods up to 1000 hr. Microstructure analyses of the aged specimens were made by means of X-ray diffraction studies and optical and electron-micrographic examinations. Correlations of the mechanical properties with the structural analyses were made with the aid in part of mathematical analyses. (N7, Q4, Ni)

196-N. Solidification of Cast Iron. (In French.) Marcel Cuédras. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 243, 245, 247.

Reviews the process and proposes new hypothesis for formation of graphite. (N12, N8, Fe)

197-N. Electron Diffraction Study of Iron Cementation. (In French.) J. J. Trillat and S. Oketani. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 289-295.

Previously abstracted from *Comptes Rendus* (France). See item 184-N, 1950. (N8, J28, Fe)

198-N. Relation Between the Deformation and Recrystallization of Monocrystals of Aluminum. (In French.) A. Laloeuf and Ch. Crussard. *Revue de Métallurgie,* v. 48, June 1951, p. 462-470; disc., p. 470.

Deformation is shown to depend on crystal-orientation; rotation is an essential factor in consolidation. In recrystallization, the germ is a portion of crystal which has undergone rotation about two axes, resulting from two abnormal slippings. 14 ref. (N5, Q24, Al)

199-N. Epitaxial Growth of Iron Protoxide Crystals by Careful Oxidation of Iron at High Temperatures. (In French.) Jacques Bénard and Jean Bardolle. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, June 11, 1951, p. 2217-2218.

Describes above for low pressures and shows that it favors a relationship of orientation between the oxide and the metal beneath, permits formation of epitaxial layers of notable thickness and with characteristic geometric form, and makes evident some inequalities in rate of growth. (N3, R2, Fe)

200-N. The Rate of Precipitation of Highly Pure Zinc-Aluminum and Zinc-Copper Solid Solutions. (In German.) Wilhelm Hofmann and Gudrun Fahrenhorst. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 460-462.

Solubilities of Al and Cu in Zn were investigated by the X-ray method at temperatures down to room temperature, and precipitation of supersaturated solid solutions was determined by X-ray and dilatometric methods. Experimental procedure and data. (N7, Zn, Al, Cu)

201-N. The Solubility of Copper and Manganese in Solid Aluminum. (In German.) Wilhelm Hofmann. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 477-479.

Studied by means of resistance measurements and metallographic methods. Sections through the Cu-Mn-Al system at 610, 525, and 400° C. were designed and distinct points of concentration shown in graphic form. (N12, Cu, Mn, Al)

202-N. Carbon in Platinum. (In German.) Hans König. *Naturwissenschaften,* v. 38, 1st Apr. No., 1951, p. 154-155.

Reviews published literature on solubility of C in Pt. 10 ref. (N12, Pt)

203-N. Black Selenium. IV. The Structure of Amorphous Selenium and Its Catalytic Transformation into Hexagonal Crystallized Selenium. (In German.) H. Krebs. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 265, June 1951, p. 156-168.

While the annular nature of amorphous Se impedes its crystallization into hexagonal phase, it is shown that certain reagents facilitate splitting of ring molecules and thus act as catalysts in the crystallization process. 25 ref. (N2, Se)

P

PHYSICAL PROPERTIES AND TEST METHODS

250-P. On the Theory of the Hall Effect. H. Koppe and J. M. Bryan. *Canadian Journal of Physics,* v. 29, July 1951, p. 274-284.

A phenomenological theory of the Hall effect is applied to the effect of an inhomogenous magnetic field on the Hall effect in thin layers, the magnetic increase of resistivity under the same conditions, and the Hall effect in a homogenous magnetic field in inhomogenous layers. Gives a simple kinetic theory. (P15)

251-P. Metallic Conduction—The "Internal Size-Effect". D. K. C. MacDonald. *Philosophical Magazine,* ser. 7, v. 42, July 1951, p. 756-761.

The conception as an "internal size-effect" of internal boundaries in a metal is proposed and discussed in relation to a number of problems. The behavior of the electrical resistance under a magnetic field is of particular interest and it is suggested that this may be relevant to the anomalous effects observed in gold (and other metals) at low temperatures and to the peculiar magnetoresistive characteristics of ferromagnetics. 16 ref. (P16, Au)

252-P. The Atomic Heats of the Rare-Earth Elements. D. H. Parkinson, F. E. Simon, and F. H. Spedding. *Proceedings of the Royal Society,* ser. A, v. 207, June 22, 1951, p. 137-155.

Atomic heats of La, Ce, Pr, and Nd were measured from 2 to 180° K. La shows an anomaly corresponding to superconductivity at 4·37° K. Ce, Pr, and Nd all behave anomalously. A theoretical explanation is attempted. 31 ref. (P12, EG-g)

253-P. Torque Curves and Other Magnetic Properties of Alcomax. K. Hoselitz and M. McCaig. *Proceedings of the Physical Society,* v. 64, sec. B., July 1, 1951, p. 549-559.

Using a torque magnetometer, the crystal anisotropy constants of the permanent magnet alloy Alcomax III were determined. The changes in crystal anisotropy are compared with parallel measurements on the hysteresis curve. A direct experiment shows that when the field applied during cooling makes an angle with the crystal axes, the preferred direction is much nearer to a (100) axis than the field direction. (P16, SG-n)

254-P. Change of the Sign of Magnetostriction as the Result of Expansive Stresses. II. (In German.) A. Elsas and E. Vogt. *Zeitschrift für Naturforschung,* v. 6a, May 1951, p. 233-238.

Results of measurements of magnetostriction on a Hensler alloy (74.2% Cu, 15.2% Mn, 10.1% Al), an Fe-Ni alloy, and Ni. In certain Fe-Ni alloys, high tensile stresses are found to reverse the positive sign of magnetostriction despite the fact that the magnetostriction of monocrystals is positive in all directions. This change in sign can be explained by the very great anisotropy of magnetostriction. (P16, Cu, Fe, Ni)

255-P. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. S. A. Standing, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 139-158.

Previously abstracted from *American Society for Testing Materials,* Preprint 10, 1950. See item 198-P, 1950. (P15, S22, SG-q)

256-P. Heat Conductivity of Steels and a Few Other Metals at Low Temperatures. J. De Nobel. *Physica,* v. 17, May 1951, p. 551-562.

Heat conductivities of Al, Fe, Ni, monel metal and of Ni, Mn, and Cr steels were investigated at the temperatures of liquid hydrogen and liquid air. The two methods employed to measure heat conductivities are described and results are given. 20 ref. (P11, Al, Fe, Ni, AY)

257-P. Reduction of Ferrous Oxides. O. H. Gellner and F. D. Richardson. *Nature,* v. 168, July 7, 1951, p. 23-24.

Layers of wüstite approximately 10^{-2} mm. thick were prepared by passing controlled mixtures of H_2 and water vapor over strips of the Fe at 900 and 950° C. Layers were then reduced in H_2 at temperatures ranging from 600 to 1000° C. Kinetics of the reduction were studied and the mechanisms followed by microscopic examination. (P13, Fe)

258-P. Growth Characteristics of Some Cast Irons Used for Ingot Moulds. W. C. Heselwood and F. B. Pickering. *Journal of the Iron and*

Steel Institute, v. 168, July 1951, p. 277-286.

Repeated heating and cooling tests were followed by determination of the isothermal growth at different temperatures, and the measurement of growth occurring during 5 hr. at 700° C. under conditions of limited access of air (to minimize scaling) was finally adopted as an arbitrary test, and was applied to 16 irons of differing analyses. From the results, a tentative relationship was obtained indicating the influence of Si, Mn, and P on susceptibility to growth. The mechanism of growth in cast irons is discussed, and a suggested mechanism is tested experimentally. (P10, CI)

259-P. Magnetic Properties of Spheroidal-Graphite Iron. K. G. Hinton. *Foundry Trade Journal*, v. 91, July 19, 1951, p. 69-70.

Critically discusses recent paper by H. E. Stauss (May 24, 1951; see item 203-P, 1951.) Comparative data obtained by Stauss and the writer are charted and discussed. (P16, CI)

260-P. Statistical Study of Some Factors Related to Cast-Iron Composition for Blast Furnaces. (In French.) P. Rocquet and C. G. Thibaut. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 303-313.

Effect of temperature, relation of Si and S contained in cast iron, and relation between composition of cast iron and that of slag. (P12, Fe)

261-P. Methods of Measuring Thermal Conductivity of Solids. (In French.) Pierre Vernotte. *Métaux; Corrosion-Industries*, v. 26, May 1951, p. 216-217.

A critical review of two methods. (P11)

262-P. Radioactivity of Natural Bismuth. (In French.) Henriette Faraggi and André Berthelot. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, June 4, 1951, p. 2093-2095.

Examination of nuclear emulsions impregnated with Bi and preserved under proper conditions for two years favors the assumption of alpha-radiation of Bi. (P13, Bi)

263-P. Ferromagnetic Properties of "Semioxidic" Iron and Iron-Cobalt Powders. (In German.) F. Lihl. *Acta Physica Austriaca*, v. 4, May 1951, p. 360-379.

Semioxidic iron is defined as a carbonaceous oxide whose iron content is the same as FeO. Pressed bodies of bivalent iron formate and oxalate and of iron-cobalt formate solid solution were used to determine effect of time and temperature of reduction on coercive force, remanence, and energy content. Results are found to agree with Néel's theory on the coercive force of very fine ferromagnetic powders. (P16, Fe, Co)

264-P. The Properties of Binary Mixtures of Metals. (In German.) W. Späth. *Metall*, v. 5, July 1951, p. 295-299.

Shows that simple basic assumptions can be used to derive a number of physical property curves for binary mixtures, which closely agree with experimentally determined curves. (P general)

265-P. Change of the Electric Resistance of Pure Metals at the Melting Point. (In German.) *Naturwissenschaften*, v. 38, (1st Apr. No.), 1951, p. 158-159.

Explains theoretically the relatively low change in electrical resistance of melting metals. (P15)

266-P. The Effect of Brillouin Zones on the Physicochemical Properties of Alloys. (In German.) *Naturwissenschaften*, v. 38, (2nd Apr. No.) 1951, p. 185-186.

Investigated by a study of constitution diagram, magnetic susceptibility, and H_2-solubility of the quasi-binary $MgCu_2$-$MgZn_2$ system. (P16, M24, Mg, Cu, Zn)

267-P. Electron Emission From Metal Surfaces as After-Effect of Mechanical Working or Exposure to Glow Discharge. (In German.) O. Haxel, F. G. Houtermans, and K. Seeger. *Zeitschrift für Physik*, v. 130, No. 1, 1951, p. 109-123.

Grinding a metal surface with emery cloth or exposing it to a glow discharge results in a gradually fading electron emission. Method of measuring strength, duration, and temperature effect on electron emission. Results show that the product of strength and duration is always the same. 16 ref. (P15)

268-P. The Atomic Heats of Several Metals. (In German.) Oswald Kubaschewski. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 445-451.

Published data on the atomic heats of Li, Mg, Ca, Ba, Tl, P, Bi, Se, Te, Ni, and Fe, determined above and below their melting points, are compared in order to determine most probable atomic heats. A formula on atomic heats, used in thermochemical computations, is presented, its validity range indicated, and its probable degree of accuracy estimated. 82 ref. (P12)

269-P. Magnetic Properties of Amalgams of the Ferrous Metals. (In German.) Franz Pawlek. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 451-453.

Method of preparing amalgams and of investigating them by X-ray and magnetic methods. Electrolytic deposition of iron on Hg cathodes is shown to form no amalgams. Of three amalgams of Ni, Co, and Mn, only Co amalgam is found to have magnetic properties. 11 ref. (P16, Fe, Ni, Co, Mn)

270-P. Effect of Atomic Volume on the Heat of Formation of Solid Solutions of Binary Metallic Systems. (In German.) Theo Heumann. *Zeitschrift für Metallkunde*, v. 42, June 1951, p. 182-189.

Shows that a lattice is distorted by incorporation of foreign atoms that are greater or smaller than atoms of the basic lattice. Endothermal energy of distortion can be roughly computed from a simple lattice model, and this energy adds to total heat of formation and frequently decides mutual behavior of two metals. 23 ref. (P12, N12)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

435-Q. The Application of Plastic Theory to Bending. M. Ish-Horowicz. *Aircraft Engineering*, v. 23, July 1951, p. 203-206.

General theoretical principles involved in applying "limit design" to structural members. 36 ref. (Q23, Q5)

436-Q. Stress Concentration in Built-Up Structural Members. J. W. Carter. *American Railway Engineering Association—Bulletin* v. 53, June-July 1951, p. 1-34.

Analysis of tests made at Purdue University to determine stress concentrations in plates in the vicinity of rivet or bolt holes under varying conditions of pitch, gage, edge distance, bearing, and clamping force. 10 ref. (Q25, ST)

437-Q. Determination of the Dynamic Coefficient of Friction for Transient Conditions. G. G. Gould. *Transactions of the American Society of Mechanical Engineers*, v. 73, July 1951, p. 649-654; disc., p. 654.

A numerical value cannot be assigned to the coefficient of sliding friction between two materials. Curves show the behavior of friction during a transient period for many different combinations of friction materials and mating surfaces. Considers specifically friction-clutch and brake applications. (Q9, CN, SS, CI, Ni, Cr, Cu)

438-Q. Effect of Internal Pressure on Stresses and Strains in Bolted-Flanged Connections. D. B. Wesstrom and S. E. Bergh. *Transactions of the American Society of Mechanical Engineers*, v. 73, July 1951, p. 553-562; disc., p. 562-568.

Actual conditions existing in a bolted joint of alloy steels will be considerably different from those assumed when using concept of design as specified by ASME Unfired Pressure Vessel Code. Formulas are derived and results summarized in the form of a design procedure. (Q25, K13, AY)

439-Q. Performance of Oil-Film Bearings With Abrasive-Containing Lubricant. A. E. Roach. *Transactions of the American Society of Mechanical Engineers*, v. 73, July 1951, p. 677-685; disc., p. 685-686.

An experimental study. It is found that the rate of temperature rise suffered by the bearing when abrasive-containing oil is introduced offers a convenient criterion for rating the embedability performance. Relative embedability ratings for 17 different bearings are correlated with wear rates. 10 ref. (Q9, CN, Cu, Al)

440-Q. The Effect of Oil Viscosity on the Power-Transmitting Capacity of Spur Gears. V. N. Borsoff, J. B. Accinelli, and A. G. Cattaneo. *Transactions of the American Society of Mechanical Engineers*, v. 73, July 1951, p. 687-694; disc., p. 694-696.

Tests show that a relationship exists between the maximum horsepower which gears can transmit without scoring, and the product of gear speed and lubricant viscosity. An analysis of the factors entering into this relation indicates that the influence of lubricant viscosity on the power-transmitting capacity of gears is much too great to be neglected in the design of gears. (Q9, AY)

441-Q. Explanation of Hot-Cracking of Mild Steel Welds, E. C. Rollason and D. F. T. Roberts. *Australasian Engineer*, May 7, 1951, p. 85-87.

Previously abstracted from *Welding Research* (bound with *Transactions of the Institute of Welding*). See item 137-Q, 1951. (Q27, K1, CN)

442-Q. Properties of Materials and Engineering Uses of Cast Metals. R. W. Bailey. *Engineering*, v. 172, July 6, 1951, p. 29-32.

Cast metals may offer an alternative to wrought metals where their mechanical properties will permit it. Ductility, tensile strength, elasticity, and fatigue-resistance of steel castings. (Q general, CI)

443-Q. Analysis of Rockwell Hardness Test, Employing a New Deadweight Testing Machine. C. E. Phillips and A. J. Fenner. *Engineering*, v. 172, July 13, 1951, p. 57-61.

The use of dead-weight loading and a frictionless support of the indenter eliminates the possibility of random errors in the magnitudes of applied loads. Results of experiments made on nine steel plates. (Q29)

444-Q. Stress-Testing of Metals at High Temperatures. *Industrial Heating*, v. 18, July 1951, p. 1186, 1188.

Relates the above to present-day

high efficiency and reliability of boilers, and generally reviews metallurgical practices in testing. (Q general)

445-Q. Production Problems. VI. Failure of Steel Sheet During Pressing. *Iron and Steel,* v. 24, July 1951, p. 335-336.

Steel sheet $\frac{1}{16}$ in. thick, which failed during blanking and pressing was investigated. Mechanical tests and micro-examination were performed on the specimens. (Q general, G2, CN)

446-Q. Strain Rate Sensitivity of Molybdenum at Room Temperature. Robert Maddin and Robert Pond. *Metal Progress,* v. 60, July 1951, p. 76-78.

Investigates the effect of strain rate on the elongation, reduction of area, tensile strength, yield strength and rupture strength of Mo. (Q27, Mo)

447-Q. Properties of Metals Used at Low Temperatures. *Metal Progress,* v. 60, July 1951, p. 79-80, 108, 110, 114, 116, 118.

Review of nine papers and a movie presented at the Annual Metallurgical Conference held at the National Bureau of Standards. Papers covered the influence of low temperatures on the mechanical properties of metals. (Q general)

448-Q. The Plastic Theory of Bending of Mild Steel Beams With Particular Reference to the Effect of Shear Forces. M. R. Horne. *Proceedings of the Royal Society,* ser. A, v. 207, June 22, 1951, p. 216-228.

While the simple plastic theory of bending gives a satisfactory explanation of observed behavior of mild steel beams, it is open to various theoretical objections. These are examined by reference to the theory of perfectly plastic materials, and a special examination is made of the effect of shear forces, for which no allowance is made in the simple theory. Results are applied to beams of both rectangular and I-section, and it is shown that the error involved in using the simple theory is small except for very short members. (Q5, CN)

449-Q. Stresses Imposed by Processing. O. J. Horger. *SAE Quarterly Transactions,* v. 5, July 1951, p. 393-403.

Thermal and transformation stresses that are developed in some heat treating operations and how they affect machine parts. Discusses macroscopic types of stresses rather than microstresses. 27 ref. (Q25, J general)

450-Q. Slip of Structural Steel Double-Lap Joints Assembled With High-Strength Bolts. Part II. Effect of Surface Condition of Faying Area Upon Slip. D. R. Young and R. A. Hechtman. *Trend in Engineering at the University of Washington,* v. 3, July 1951, p. 23-26.

Bolted joints with various surface conditions were tested. Coefficients of friction for mill-scale plates with drilled, subpunched and reamed holes were determined. Varnish or red-lead paint on the faying surfaces exhibited little resistance to slip. (Q9, K13, CN)

451-Q. Interpretive Report on Box Girders and Small Specimens. LaMotte Grover, E. M. MacCutcheon, W. S. Pellini, W. Spraragen, and J. Vasta. *Welding Journal,* v. 30 July 1951, p. 321s-326s.

The effect of a combination of high residual stresses, with severe constraint against ductile behavior, upon the capacity of a structural member for resisting rupture under external load was investigated. Extent of deformation which occurs when the member is subjected to continually increased loading, with the load relaxed between increments of loading was determined. Structures made of steels which are not relatively notch sensitive at low temperatures are able better to sustain loads at such low temperatures than those which are made of notch-sensitive steels. (Q23, T26)

452-Q. Relative Strain Aging Tendency of Weld and Base Metal. E. J. Ripling and L. J. Klingler. *Welding Journal,* v. 30, July 1951, p. 356s-358s.

Complex relationships between prestraining, strain aging and testing temperature on SAE 1340 steel, quenched and tempered at various temperatures. Discussion of paper by R. W. Fountain and R. D. Stout in January 1951 issue. See item 50-Q. (Q23, J27, CN)

453-Q. ML Aluminum Casting Alloy —A Material for Elevated Temperatures. J. C. McGee. *CADO Technical Data Digest,* v. 16, Aug. 1951, p. 6-7.

Comparative mechanical properties of above alloy and a number of other standard Al alloys at room temperature and 600° F. Principal properties covered are tensile, yield, and creep strengths. Nominal composition of the new alloy is 4% Cu, 2% Ni, 2% Mg, 0.3% Mg, 0.3% Cr, 0.05% V, 0.1% Ti, rest Al. (Q general, Al, SG-h)

454-Q. A Survey of Some Recent Researches in Theory of Elasticity. J. N. Goodier. *Applied Mechanics Reviews,* v. 4, June 1951, p. 330-332.

Numerous references classified by subject. (Q21)

455-Q. Theories of Mechanical Behavior of Materials. Alfred M. Freudenthal. *Applied Mechanics Reviews,* v. 4, July 1951, p. 394-396.

103 references. (Q general)

456-Q. Effect of Alloying Elements on the Elevated Temperature Plastic Properties of Alpha Solid Solutions of Aluminum. O. D. Sherby, R. A. Anderson, and J. E. Dorn. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 643-652.

Solid-solution alloying increases the plastic properties of Al at elevated temperatures by solid-solution strengthening, by restraining recovery and recrystallization, and by a Cottrell effect. When binary aluminum alloys are strained and aged at 194 to 300° K. they develop a yield point. This is attributed to a migration of dislocations to solute atoms during aging. 13 ref. (Q23, N7, Al)

457-Q. Structural Studies of Plastic Deformation in Aluminum Single Crystals. N. K. Chen and C. H. Mathewson. *Journal of Metals,* v. 3, Aug. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 653-660.

Single crystals of high-purity Al of various orientations were carefully documented after plastic extension. Special attention was given to the formation of slip lines, deformation bands, and asterism. An explanation for the geometry and mechanism of formation of deformation bands is considered. 21 ref. (Q24, Al)

458-Q. Determination of the Fatigue Limit of Metals by Means of a Three-Ring Test Machine. M. M. Khrushchov and M. A. Babichev. *Engineers' Digest,* v. 12, July 1951, p. 230. (Translated and condensed)

Previously abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory). See item 9-313, 1949. (Q7)

459-Q. Preliminary Investigation of Wear and Friction Properties Under Sliding Conditions of Materials Suitable for Cages of Rolling-Contact Bearings. Robert L. Johnson, Max A. Swikert, and Edmond E. Bisson. *National Advisory Committee for Aeronautics,* Technical Note 2384, June 1951, 31 pages.

Investigations of wear and friction properties of a number of materials operating against SAE 52100 steel were conducted. Materials included brass, bronze, Be, Cu, monel, Nichrome V, 24S-T Al, nodular Fe, and gray cast Fe. The ability of materials to form surface films that prevent welding is a most important factor in both dry friction and boundary lubrication. 11 ref. (Q9, ST, Be, Cu, Ni, Al, Fe)

460-Q. Fatigue Strengths of Aircraft Materials, Axial-Load Fatigue Tests on Notched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel with Stress Concentration Factors of 2.0 and 4.0. H. J. Grover, S. M. Bishop, and L. R. Jackson. *National Advisory Committee for Aeronautics,* Technical Note 2389, June 1951, 64 pages.

Results of axial-load fatigue tests on notched specimens of the above. Fatigue tests were run at several levels of nominal mean stress, including a zero nominal mean stress. (Q7, Al, ST)

461-Q. Fatigue Strengths of Aircraft Materials. Axial-Load Fatigue Tests on Notched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel With Stress-Concentration Factor of 5.0. H. J. Grover, S. M. Bishop, and L. R. Jackson. *National Advisory Committee for Aeronautics,* Technical Note 2390, June 1951, 19 pages.

Each specimen was notched by edge notches designed to have a theoretical stress-concentration factor of 5.0. Tests were run at four levels of nominal mean stress: 0, 10,000, 20,000, and 30,000 psi. (Q7, Al, ST)

462-Q. Charts Giving Critical Compressive Stress of Continuous Flat Sheet Divided into Parallelogram-Shaped Panels. Roger A. Anderson. *National Advisory Committee for Aeronautics,* Technical Note 2392, July 1951, 31 pages.

Stability under compressive stress of continuous flat sheet divided by nondeflecting supports into an array of parallelogram-shaped panels. Wide ranges of panel skewness and aspect ratio were investigated, and two orientations of the parallelogram-shaped panels with respect to the direction of the applied stress were considered. The results are presented in the form of charts of theoretical buckling-stress coefficients as a function of panel skewness and aspect ratio. (Q28)

463-Q. Influence of Tensile Strength and Ductility on Strengths of Rotating Disks in Presence of Material and Fabrication Defects of Several Types. Arthur G. Holms, Joseph E. Jenkins, and Andrew J. Repko. *National Advisory Committee for Aeronautics,* Technical Note 2397, June 1951, 39 pages.

The significance of tensile strength and ductility in the presence of defects and the strength-reducing effects of several types of defect were investigated for some rotating disks. The types of defect investigated included laminar-type irregularities, eutectic melting, and shrink porosity. (Q23, SS)

464-Q. Observations on Bauschinger Effect in Copper and Brass. H. Schwartzbart, M. H. Jones, and W. F. Brown, Jr. *National Advisory Committee for Aeronautics,* Research Memorandum E51D13, June 19, 1951, 37 pages.

The effect of prestrain in tension upon the stress-strain characteristics in compression was studied for Cu and brass. Compression testing of Cu prestrained in tension various amounts yielded: that the Bauschinger effect developed at very small

prestrains was independent of prestrains and disappeared after the strain in the subsequent compression test exceeded $\delta = 0.01$. Tensile prestrain weakened the material in subsequent compression and affected the shape of the stress-strain curve obtained. 19 ref. (Q24, Cu)

465-Q. Effect of Surface Finish on Fatigue Properties at Elevated Temperatures. I. Low-Carbon N-155 With Grain Size of A.S.T.M. 1. Robert R. Ferguson. *National Advisory Committee for Aeronautics,* Research Memorandum E51D17, June 26, 1951, 18 pages.

The effect of three surface finishes of varying roughnesses on the fatigue properties was determined for low-carbon N-155 alloy of grain size A.S.T.M. 1 at temperatures of 80, 1000, 1350, and 1500° F. The fatigue properties for the various finishes differed at room temperatures; after short periods at 1000° F. and for all periods investigated at temperatures above 1000° F., specimens having different finishes had the same fatigue strength. (Q7, CN)

466-Q. Determination of the Effective Strained Length of Standard Stud Bolts. Robert S. Sherwood and Richard C. Dove. *American Society of Mechanical Engineers,* Paper 51-S-2, 1951, 10 pages.

Reports on a project in an attempt to develop a better method for relating initial tensile strain in a threaded fastener to over-all elongation produced during tightening. Errors of the present method of relating initial tensile strain to elongation. A new formula relating initial tensile strain and elongation is derived. (Q27, K13)

467-Q. Damping, Fatigue, and Dynamic Stress-Strain Properties of Mild Steel. B. J. Lazan and T. Wu. *American Society for Testing Materials,* Preprint 22, 1951, 30 pages.

Above properties were investigated in recently developed rotating-beam testing equipment. Effect of several important test variables, such as stress magnitude, history, frequency, and rest. Stress magnitude and stress history data are analyzed in terms of cyclic-stress-sensitivity limit and stabilized damping points. These data are presented in S-N-N, S-N-D, and other new types of diagrams to indicate not only the fatigue behavior but also damping and dynamic-modulus properties. 13 ref. (Q7, Q8, CN)

468-Q. Creep Characteristics of Phosphorized Copper (0.019 Per Cent P) at 300, 400, and 500 F. A. I. Blank and H. L. Burghoff. *American Society for Testing Materials,* Preprint 35, 1951, 13 pages.

Tests made in three annealed and three cold drawn tempers. Results compared with those previously obtained by the authors on other types of copper. (Q3, Cu)

469-Q. Report of Joint Committee on Effect of Temperature on the Properties of Metals. Ernest L. Robinson, chairman. *American Society for Testing Materials,* Preprint 92, 1951, 7 pages.

Summarizes meetings, publications, technical papers, finances, research projects, personnel, and panel activities. (Q general)

470-Q. Report of Committee B-9 on Metal Powders and Metal Powder Products. W. A. Reich, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 184-187.

Previously abstracted from *American Society for Testing Materials.* Preprint 8a, 1950. See item 463-Q, 1950. (Q general, H general, S22)

471-Q. Report of Committee E-9 on Fatigue. R. E. Peterson, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 497-508.

Previously abstracted from *American Society for Testing Materials.* Preprint 107, 1950. See item 481-Q, 1950. (Q7)

472-Q. The Influence of Strain Rate on Some Tensile Properties of Steel. D. S. Clark and P. E. Duwez. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 560-575; disc., p. 576.

Previously abstracted from *American Society for Testing Materials,* Preprint 17, 1950. See item 465-Q, 1950. (Q27, Q6, ST)

473-Q. The Influence of Specimen Dimension and Shape on the Results in Tension Impact Testing. D. S. Clark and D. S. Wood. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 577-585; disc., p. 586.

Previously abstracted from *American Society for Testing Materials,* Preprint 43, 1950. See item 476-Q, 1950. (Q27, CN, Cu)

474-Q. Effect of Variations in Notched Acuity on the Behavior of Steel in the Charpy Notched-Bar Test. N. A. Kahn, E. A. Imbembo, and F. Ginsberg. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 619-647; disc., p. 647-648.

Effects of small variations in notch-root radius of Charpy V and keyhole-type specimens on the energy-absorption level and location of the transition temperature region of a number of steels. Materials used consisted of Navy medium and high-tensile strength steels and SAE 1045 and 4620 steels, heat treated to tensile strength levels of approximately 60,000, 70,000, 85,000, 110,000, or 155,000 psi. (Q6, CN, AY)

475-Q. The Fatigue Strength of Steel Through the Range From ½ to 30,000 Cycles of Stress. M. H. Weisman and M. H. Kaplan. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 649-665; disc., p. 666-667.

Relatively few fatigue tests reported in the literature include data for lifetimes of less than 50,000 cycles. Data from this report were compiled and replotted in terms of life vs. stress in per cent of tensile strength. Unidirectional axial-load and sheet-bending fatigue tests were conducted to obtain short-life fatigue data for SAE 4340 steel heat treated to 215,000 psi. tensile strength. Fatigue-strength curves based on the information compiled are presented for both smooth and notched specimens and for unidirectional as well as for reversed loading. 24 ref. (Q7, AY)

476-Q. Effects of Grinding and Other Finishing Processes on the Fatigue Strength of Hardened Steel. L. P. Tarasov and H. J. Grover. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 668-687; disc., p. 687-698.

Previously abstracted from *American Society for Testing Materials.* Preprint 18, 1950. See item 466-Q, 1950. (Q7, G18, G19, AY)

477-Q. Effect of Chromium Plating on the Endurance Limit of Steels Used in Aircraft. Hugh L. Logan. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 699-713; disc., p. 714-716.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 3B-219, 1949. (Q7, L17, Cr, AY)

478-Q. Fatigue Notch-Sensitivities of Some Aircraft Materials. Horace J. Grover. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 717-729; disc., p. 730-734.

Information for SAE steels 4130, 4140, and 4340; Al alloys 24S-T and 75S-T; and 18-8 stainless steel. The tabulated and charted data fail to provide rules for accurate design; however, some principles believed to be conservative are derived. 12 ref. (Q7, AY, Al, SS)

479-Q. Effects of Anodic Coatings on the Fatigue Strength of Aluminum Alloys. G. W. Stickley and F. M. Howell. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 735-742; disc., p. 743.

Previously abstracted from *American Society for Testing Materials,* Preprint 32, 1950. See item 470-Q, 1950. (Q7, L19, Al)

480-Q. Effect of Various Treatments on the Fatigue Strength of Notched S-816 and Timken 16-25-6 Alloys at Elevated Temperatures. W. E. Jones, Jr., and G. B. Wilkes, Jr. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 744-760; disc., p. 761-762.

Previously abstracted from *American Society for Testing Materials,* Preprint 35, 1950. See item 472-Q, 1950. (Q7, G23, Co, SG-h)

481-Q. Hardening of Austenitic Stainless Steels by Mechanical Working at Sub-Zero Temperatures. N. A. Ziegler and P. H. Brace. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 882-892; disc., p. 880-881.

Previously abstracted from *American Society for Testing Materials,* Preprint 39, 1950. See item 474-Q, 1950. (Q general, F22, F23, G23, SS)

482-Q. Hardened Alloy Steel for Service Up to 700 F. G. V. Smith, W. B. Seens, and E. J. Dulis. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 882-892; disc., p. 893-894.

Previously abstracted from *American Society for Testing Materials,* Preprint 36, 1950. See item 473-Q, 1950. (Q general, AY)

483-Q. Effect of Temperature on the Mechanical Properties, Characteristics, and Processing of Austenitic Stainless Steels. V. N. Krivobok and A. M. Talbot. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 895-928; disc., p. 929-930.

Results of investigations show that processing such as rolling of commercial austenitic stainless steels at subzero temperatures enhances mechanical properties and improves other characteristics of the steels. Improvement of ductility characteristics, under subzero temperatures, of steels strengthened by rolling is discussed in terms of its relation to the forming process. 10 ref. (Q general, F23, SS)

484-Q. Effect of Rate of Strain on the Flow Stress of Gas Turbine Alloys at 1200 and 1500 F. M. J. Manjoine. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 931-948; disc., p. 949-950.

Results of tension tests at 1200 and 1500° F. on group of high-temperature, gas-turbine alloys. Tests include creep and creep-rupture tests, constant strain rate tests, and high-speed impact tests. Strengths are shown for strain rates from 10^{-7} to 10^{+6} per hr. Factors which influence the flow-stress of a metal and a generalized flow-stress curve. Short-time methods of comparing alloys and limitations of these methods. 32 ref. (Q23, Ni, Co, SG-h)

485-Q. The Selection of a Limited Number From Many Possible Conditioning Treatments for Alloys to Achieve Best Coverage and Statistical Evaluation. J. M. Cameron and W. J. Youden. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 951-960; disc., p. 961-964.

Stress-rupture data present special problems because the number of conditioning factors preclude exhaustive exploration of all combinations of these factors and the test results necessarily involve different test temperatures and loads so that hours to rupture of specimens from

different conditioning treatments are not directly comparable. Gives a method for comparing test results and considers the planned selection of combinations of conditioning factors for testing in order to facilitate the statistical analysis. (Q4, S12)

486-Q. Magnesium-Cerium Cast Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 989-1010; disc., p. 1011-1012.

About 350 heats of Mg-Ce alloys, most of which contained other elements, were prepared and studied. Evaluation was based on tension tests at room temperature and at 600° F.; creep tests at 600° F., using a 2000-psi. and a 2500-psi. load; and macro and micro-examinations. 6% Ce was selected as a compromise between cheaper and lower-density alloys of lower Ce content, on the one hand, and higher strength alloys of still higher Ce content, on the other. 12 ref.
(Q3, Q27, Mg, SG-h)

487-Q. Tensile Properties of Some Aircraft Structural Materials at Various Rates of Loading. Richard F. Klinger. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1035-1050; disc., p. 1051-1053.

Previously abstracted from *American Society for Testing Materials,* Preprint 25, 1950. See item 468-Q, 1950. (Q27, T24, Al)

488-Q. Combined Tension Torsion Creep-Time Relations for Aluminum Alloy 2S-O. Joseph Marin, J. H. Faupel, and L. W. Hu. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1054-1070; disc., p. 1071-1072.

Previously abstracted from *American Society for Testing Materials,* Preprint 33, 1950. See item 471-Q, 1950. (Q27, Q1, Q3, Al)

489-Q. The Reverting of Hard-Drawn Copper to Soft Condition Under Variable Stress. John N. Kenyon. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1073-1081; disc., 1082-1084.

Fatigue tests on long lengths of hard-drawn Cu wire show that "islands" of soft Cu may develop at the periphery. This reverting to large crystals was found to occur in some 30% of the heats tested at room temperatures and in all heats tested at 70° C. It is believed that many transmission line failures, attributed to mechanical defect, are a direct result of this softening phenomenon. (Q7, N5, Cu)

490-Q. The Forming Characteristics of Beryllium Copper Strip. J. T. Richards and E. M. Smith. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1085-1099; disc., p. 1100.

Results of tests to correlate forming characteristics prior to precipitation hardening with usual specification properties including tensile strength, elongation, and Erichsen cup test. Formability is expressed as minimum safe radius for forming a 90° bend by means of a punch and die set-up. Effects of temper, stock thickness, grain size, and grain direction upon formability and miscellaneous design or specification properties. No simple correlation was found relating formability with usual acceptance tests. 15 ref.
(Q23, Cu)

491-Q. Reproducibility of Results of Tension Tests on Specimens Prepared From Cast Steel Coupons. H. A. Schwartz and W. K. Bock. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1167-1175.

Previously abstracted from *American Society for Testing Materials,* Preprint 16, 1950. See item 464-Q, 1950. (Q27, CN)

492-Q. Rockwell C Hardness on Cylindrical Steel Specimens. Frank W. Hussey. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1176-1185; disc., p. 1186-1187.

Previously abstracted from *American Society for Testing Materials,* Preprint 20, 1950. See item 467-Q, 1950. (Q29, CN)

493-Q. A Method for Making Tension Tests of Metals Using a Miniature Specimen. R. L. Templin and W. C. Aber. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1188-1194; disc., p. 1195.

Previously abstracted from *American Society for Testing Materials,* Preprint 28, 1950. See item 469-Q, 1950. (Q27)

494-Q. Symposium on Stresses in Moulds. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 261-301.

Papers are abstracted separately. Contains an introduction, and is closed with a general discussion and 20 ref. (Q25, CI)

495-Q. Mechanical Properties of Ingot Mould Irons. J. W. Grant. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 263-273.

Mechanical tests were carried out on ingot-mold irons at temperatures up to 800° C. to provide stress-strain data from which stresses in ingot molds may be calculated, and to investigate the behavior of these materials under the type of stress and strain conditions to which an ingot mold may be subjected during its life. Transverse, tensile, compression, creep, and endurance tests were carried out. (Q general, CI)

496-Q. Poisson's Ratio For Cast Iron Used for Ingot Moulds. J. Woolman. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 273-277.

A lateral extensometer suitable for attaching to a test piece in a cylindrical electrical furnace was designed and constructed. With this, in conjunction with a conventional type Lamb roller extensometer, Poisson's ratio determinations were made on a number of ingot-mold irons, both at room and elevated temperatures. A theory is put forward to account for the observed variation in the properties of the iron with graphite size. (Q21, CI)

497-Q. Note on Relaxation Tests on Cast Iron. J. Woolman. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 287.

Briefly describes two tests.
(Q3, CI)

498-Q. Determination of Surface Stresses in Ingot Moulds. M. W. Butler and W. H. Glaisher. *Journal of the Iron and Steel Institute,* v. 168, July 1951, p. 287-299.

Results of tests and the possibilities of the stress causing failure of the mold by cracking. The temperature cycle at various points in a mold, and the effect of heat treatments designed to promote growth of the mold iron, and to determine the extent of residual stresses in the mold when cold, were examined. (Q25, CI)

499-Q. The Properties of Materials and the Engineering Uses of Cast Metals. R. W. Bailey. *Metallurgia,* v. 44, July 1951, p. 3-8.

Previously abstracted from *Foundry Trade Journal.* See item 393-Q, 1951. (Q general, E general, CI, Cu)

500-Q. Uneven Hardness Gradients in Quenched Steels. Hugh O'Neill. *Metallurgia,* v. 44, July 1951, p. 29-31.

Jominy hardenability curves occasionally show an unusual rise or hump. Similar effects have been found in hardness surveys of welded joints and in steel rails which have had special "hardening" treatment applied to the head. Suggests that the original austenite transforms locally in the intermediate range.
(Q29, N8, ST)

501-Q. D.T.D. 424—The Versatile Light Alloy. A. P. Fenn. *Institute of British Foundrymen,* Paper 1005, 1951, 7 pages; *Foundry Trade Journal,* v. 91, July 26, 1951, p. 87-92.

Development of this Al-Cu-Si alloy shows that by various heat treatments, a considerable range of mechanical properties can be obtained, thereby enabling it to be used for a greater variety of applications. The alloy is equally suitable for sand casting, gravity die casting, and pressure die casting. Methods used in the manufacture of one of the largest light-alloy sand castings ever produced.
(Q general, E11, E13, Al)

502-Q. Stresses in Gas-Turbine Discs and Rotors. R. W. Bailey. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 30-35.

The nature of the operating stresses in "thin" and "thick" disks, and the resistance of ferritic and austenitic steels to bursting stresses. For austenitic steel, the importance of plastic strain in improving the properties at the central region of a disk or rotor, and thereby raising its bursting speed, is shown.
(Q25, T25, SS, AY)

503-Q. Properties of Materials Intended for Gas Turbines. H. W. Kirkby and C. Sykes. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 81-94.

Properties of creep resisting steels suitable for use in the gas turbine and jet engine. Materials are classified under ferritic steels and austinitic steels. Results of room-temperature mechanical tests and creep tests on bars and forgings enable comparisons to be made of the intrinsic properties of the various materials and provide information on the variation in properties with size.
(Q general, Q3, SS, AY)

504-Q. Study of the Properties of a Chromium-Nickel-Niobium Austenitic Steel. H. W. Kirkby and C. Sykes. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 95-106.

Properties of wrought 18-10 Cr-Ni steel (stabilized with columbium), with particular reference to high-temperature applications. Creep properties, tensile properties, and fatigue properties. Various metallographical aspects of the 18-10 type of austenitic steel. Factors which may influence the shape of the creep curves. 11 ref. (Q3, Q7, Q27, SS)

505-Q. Creep-Resisting Ferritic Steels. E. W. Colbeck and J. R. Rait. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 107-124.

One of the outstanding materials of this type, namely, the 3% Cr-Mo-W-V alloy steel, was studied in detail. Influence of composition, constitution, and heat treatment on the creep properties. It is believed that at least three other steels with 0, 1.0, and 10.0% Cr, with excellent creep properties, will become available in the near future. 16 ref.
(Q3, AY)

506-Q. Ferritic Steels for Gas Turbines. H. H. Burton, J. E. Russell, and D. V. Walker. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 125-134.

Test results on three ferritic creep resisting steels, mainly of the 3% Cr-Mo-W-V type, are presented, the test specimens being taken from forged disks as well as from bars. The effect of variations in treatment and mechanical properties on

the creep properties was investigated, and data on the effective modulus of elasticity at test temperatures are given. The results are compared in the light of requirements for materials for turbine discs in aircraft gas turbines. (Q3, AY)

507-Q. Special Steels for Gas Turbines. W. E. Bardgett and G. R. Bolsover. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 135-148.

Data on a steel containing Ni, Cr, Mo, Co, Cb, W, and Ti tested both for creep and for general mechanical properties, with different amounts of hot work, and tested transversely and longitudinally. Properties of a 25% Cr, 15% Ni steel, suitable for combustion chambers. A steel containing about 20% Cr, 30% Ni, and 1% Ti is also suitable for combustion chambers and shows good creep resistance at certain temperatures. (Q general, AY)

508-Q. Fatigue at High Temperatures. H. J. Tapsell. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 169-174.

General characteristics of the behaviour of metals in fatigue. Effect of plastic strain in modifying the stress distribution under bending conditions. Shows that cyclic speed of stressing is an important factor. Experimental fatigue and creep data are given for some turbine blade materials, and the method of correlating these data in working stress diagrams is shown. (Q7, SG-h)

509-Q. Fatigue Tests at Elevated Temperatures. P. H. Frith. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 175-181.

Tests were carried out on hollow test pieces with reversed bending stresses, and with reversed bending stresses superimposed on a static tension or static bending stress. A few tests were carried out on turbine blades with reversed bending stresses. (Q7, SG-h)

510-Q. Hot Fatigue Testing. H. E. Gresham and B. Hall. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 181-185.

Construction of a simple single-point loading fatigue machine are given; construction of the furnace, and temperature measurement. The adaptability of the apparatus is illustrated by its use for corrosion-fatigue testing with corrosion media in the form of gases, solids, or as a spray. Specific research items in which this apparatus has proved useful are discussed. (Q7)

511-Q. Variation of Elastic Moduli With Temperature for Various Steels and Pure Metals. G. T. Harris and M. T. Watkins. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 185-188.

Determinations of Young's modulus for several gas-turbine materials and a few pure metals, at temperatures up to 800° C., were made by static and dynamic methods. In general the values determined by the two methods agree within 1%. The variation with temperature of the modulus of rigidity and Poisson's ratio was determined for two steels. 16 ref. (Q21, Fe, Al, Ni, ST)

512-Q. Some Cobalt-Rich Alloys for High-Temperature Service. J. C. Chaston and F. C. Child. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 246-248.

Stress-to-rupture characteristics at 900° C. of some alloys in the Ta-Cr-Co system were examined, particular attention being given to the influence of C on the creep endurance and microstructure of alloys containing 10% Ta and 10% Cr. (Q4, SG-h, Co)

513-Q. Three Improvements in Heat Resistant Alloys. (In French.) L. Colombier. *Métaux: Corrosion-Industries,* v. 26, May 1951, p. 218-223.

The prevention of slip by structural hardening, i.e., by formation of submicroscopic precipitates can be prevented by preliminary cold working, thus producing a rigidity up to 850° C. for some alloys. Usual techniques of forging and rolling are not applicable to some alloys, which can only be obtained by casting. (Q24, SG-h)

514-Q. Heat Resistant Aluminum Alloys. (In French.) R. Chevigny and R. Syre. *Métaux: Corrosion-Industries,* v. 26, May 1951, p. 224-232.

Factors which effect creep in light alloys, characteristics of alloys at high temperatures, and improvement of light alloys. (Q3, Al)

515-Q. Causes of Rupture of Mill Rolls. (In French.) M. R. Edelbloude. *Circulaire d'Informations Techniques,* v. 8, No. 3, 1951, p. 297-298, 300.

Suggestions for avoiding various types of rupture. Proposes methods for prolonging life of mill rolls. Types of mill rolls and their characteristics. (Q26, T5)

516-Q. Creep Testing Viewed as a Physico-Thermal Procedure. (In French.) Pierre Chevenard and Xavier Waché. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, June 11, 1951, p. 2161-2164.

If "elongation-time" curves have sufficient resolution to allow determination of rate by graphic means, then the method is applicable to study of physicochemical reactions and structures which occur in heat resistant alloys during use in thermal apparatus. (Q3, ST)

517-Q. Testing Fatigue in Electric Arc Welded Joints. (In French.) H. Dutilleul. *Soudure et Techniques connexes,* v. 5, May-June 1951, p. 97-104; disc., p. 104-108.

Behavior of welded and riveted assemblies is compared. Various types of joints were examined, and experimental evidence is used to determine particular points which should be emphasized. (Q7, K1)

518-Q. The Rupture of Steel Pieces. (In French.) A. Pignot. *Chaleur & Industrie,* v. 32, May 1951, p. 126-132; June 1951, p. 162-172.

Discusses the literature, influence of inclusions and corrosion, propagation of fissures, and control of pieces under pressure. (Q26, ST)

519-Q. Study of Internal Tensions Producing by Rolling. (In French.) Hans Bühler. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 299-302.

Nature and means of elimination. 12 ref. (Q25, F23, ST)

520-Q. Mechanical Properties Obtained by Isothermal Quenching. (In French.) R. Potaszkin and M. Jaspart. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 314-327.

(Q general, J26, AY)

521-Q. Determination of Tendency to Failure During Creep Under Multiaxial Tension After Preliminary Cold Working. (In French.) W. Siegfried. *Revue de Métallurgie,* v. 48, June 1951, p. 413-433.

Effect of preliminary cold working on the mechanical properties of steel during creep, effect of multiaxial tension on resistance, and some practical applications. (Q3, ST)

522-Q. Certain Aspects of Slip Produced by Alternating Stresses in Annealed Aluminum Crystals. (In French.) Paul-Henri Laurent. *Revue de Métallurgie,* v. 48, June 1951, p. 441-446.

Appearance of two very highly laced networks, lines of slip, and grouping of slips into wide-spaced bands were studied. In the examples studied, the grain has two directions of slip which mutually block, or depending on the case, do not interfere with each other. These slips develop in periodic order within the grain. Photomicrographs included. (Q24, Al)

523-Q. Performance and Evaluation of the Static Stress Test. (In German.) W. Späth. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, June 1951, p. 177-181.

Principles of test and determination of static stress, including a definition of limit of elasticity. A tensile test, an orienting experiment, and definition of strength values are also discussed. (Q27)

524-Q. The Effect of Test Load and Cold Working on Microhardness. (In German.) F. Vitovec. *Berg-und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, June 1951, p. 133-136.

Shows that decrease of microhardness with increasing load does not contradict Kick's law of similarity, since deformed volume of sample material is not proportional to displaced volume of substance; also that a distinction must be made between a zone that has almost maximum hardness, and a transition zone whose thickness is little affected by the depth of penetration, but rather by the degree of deformation. 18 ref. (Q29, Fe)

525-Q. Effect of Material and Manufacturing Requirements on the Durability of Steel Materials. (In German.) O. Kropf. *Berg und Hüttenmännische Monatshefte der Montanistischen Hohschule in Leoben,* v. 96, July 1951, p. 151-156.

Investigations on durability of steel-mill ingots. 19 ref. (Q23, ST)

526-Q. Internal Stresses Developed During the Continuous Casting of Aluminum. (In German.) G. Seeger. *Giesserei,* v. 38, July 12, 1951, p. 325-329.

Stresses are studied by systematically separating continuous cast bars, and measuring sections cut off. From the stress distribution, conclusions about heat removal and contraction may be drawn. The degree of internal stress depends not only on method of cooling and cross-section of bar, but also on the plasticity limit of the cast bar. (Q25, C5, Al)

527-Q. The Strength of Teeth Surfaces of Straight-Toothed Spur Gears of Steel. (In German.) G. Niemann and H. Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Feb. 21, 1951, p. 121-126.

Strength of teeth surfaces is primarily a question of resistance to rolling and pitting. Wöhler lines for gears of different steels and effect of oil viscosity and surface condition of teeth on durability of gears were determined. (Q23, T7, ST)

528-Q. Testing Machines. (In German.) H. Mintrop. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, June 21, 1951, p. 578-583.

Different types of modern mechanical testing machines used for testing miscellaneous materials. 99 ref. (Q general)

529-Q. Creep-Stress Resistance of Molybdenum, Chromium-Molybdenum, and Chromium-Molybdenum-Vanadium Steels. (In German.) Erich Theis. *Stahl und Eisen,* v. 71, June 7, 1951, p. 619-624.

Seven steels, annealed at different temperatures, were tested for yield point, tensile strength, elongation, contraction of area, and notch-impact toughness at room temperature and at 500° C. Notched and unnotched bars of same steels were

subjected to creep stresses up to 30,000 hr. at 500° C. (Q3, AY)

530-Q. Effect of Method of Notching on the Notch-Impact Toughness of Unalloyed Steels. (In German.) Michael Hansen. *Stahl und Eisen*, v. 71, June 21, 1951, p. 686-687.

Method of machining notches greatly affects the results of a notch-impact test. (Q6, CN)

531-Q. Study of the Bauschinger Effect in the Torsion of Wires. (In German.) Paul Rahlfs and Georg Masing. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 454-459.

Investigated with aid of torsion tests of Fe, brass, tin-bronze, Cu, Al, and Al alloys. Results show that the Bauschinger effect is accompanied by a hardening effect. Method of experimentation. (Q24, Q1, Fe, Zn, Cu, Al)

532-Q. A Method of Determining the Total State of Deformation From an X-Ray Recording. (In German.) Günter Kemmnitz. *Zeitschrift für Metallkunde*, v. 42, Dec. 1950, p. 492-496.

New method of determining main stresses by the back-reflection process; methods of computing significant angles; of determining the direction of main stress, and of calculating the accuracy of the method. 10 ref. (Q24)

533-Q. Phenomena Occurring in Continuously and Alternatingly Stressed Metal Structures. III. The Size of Notched and Unnotched Bars as a Factor in Fatigue Stress Reduction. (In German.) Cord Petersen. *Zeitschrift für Metallkunde*, v. 42, June 1951, p. 161-170.

A simplified formula for effect of stress reduction on fatigue strength of bars is derived and it is shown to agree with experimental results more closely than any other formula. Theory of "substitute" notch is illustrated and further developed. Formula is derived from this theory. 23 ref. (Q7, ST)

534-Q. Some Studies of Steels Under Pure Static Bending Stress. (In German.) Rudolf Böklen. *Zeitschrift für Metallkunde*, v. 42, June 1951, p. 170-174.

X-ray studies, mechanical-expansion measurements and studies of beginning and form of first flow lines on annealed and bent flat bars. These studies reveal differences in behavior of carbon steel and Cr-Mo steel. Observations are explained, and X-ray measurements indicate that strain coefficients of tension and compression are practically alike. 14 ref. (Q5, CN, AY)

535-Q. Determining Tensile Strength From Hardness of Aluminum Alloys. (In German.) Hermann Meincke. *Zeitschrift für Metallkunde*, v. 42, June 1951, p. 175-181.

Effect of crystal orientation, rolling, drawing, and forging, on tensile strength and hardness were investigated. Accurate measurements require removal of plating on Al or its alloys. A conversion factor of 0.364 yields positive correlation, with maximum deviation of 7.2%. Yield points computed from hardness are found to deviate up to 35%. (Q27, Q29, Al)

R

CORROSION

305-R. The Battle Against Corrosion. Trevor J. Williams. *Australasian Engineer*, May 7, 1951, p. 149, 151, 153.

Corrosion has been proved to be due to the action of sulphate-reducing bacteria. These microbes have the power of converting certain salts in the soil to sulfuretted hydrogen. Various methods of cure are proposed. (R1, R8)

306-R. Some Fundamentals of Corrosion & Protection. M. A. Comley. *Electroplating and Metal Finishing*, v. 4, July 1951, p. 229.

Electrochemical corrosion, the losses caused by it, and its control. (R1)

307-R. Oxidation Resistance of High Melting Alloys. *Industrial Heating*, v. 18, July 1951, p. 1278-1280.

Reviews a paper by O. Kubaschewski and A. Schneider, presented before the British Institute of Metals. (R2, Cr)

308-R. The Mechanism of the Inhibition of the Corrosion of Iron by Solutions of Sodium Orthophosphate. M. J. Pryor and M. Cohen. *Journal of the Electrochemical Society*, v. 98, July 1951, p. 263-272.

Results of experimental study of the above in the presence and absence of air. Suggests that oxygen dissolved in solution is mainly responsible for passivity by virtue of its heterogeneous reaction with surface iron atoms to form γ-Fe_2O_3 in a similar manner to that by which oxide films are formed in air. 18 ref. (R10, Fe)

309-R. Effects of Alkaline Detergents on a Magnesium Die Casting Alloy. J. Fred Hazel and William Stericker. *Journal of the Electrochemical Society*, v. 98, July 1951, p. 273-276.

Test panels of AZ91 alloy were immersed in still and electrolytic baths of alkaline electrolytes at 90° C. Weight changes and appearance of the treated panels were noted. The metal was not attacked by sodium hydroxide, sodium orthophosphate, and the more alkaline silicates, except when it was the anode. The Mg-ion sequesterers, tetrasodium pyrophosphate, Calgon, and Quadrafos caused marked weight losses. Attack of the metal occurred in all cases where it was used as the anode. 13 ref. (R5, Mg)

310-R. The Dissolution of Magnesium in Hydrochloric Acid. B. Roald and W. Beck. *Journal of the Electrochemical Society*, v. 98, July 1951, p. 277-290.

Studied by measuring dissolution rates and electrode potentials as functions of acid concentration, rate of agitation, temperature, external polarization, alloy composition, and additions to the acid solution. The measurements offer evidence in favor of a diffusion-controlled reaction. Stirring effect of the hydrogen bubbles was evaluated. Changes in electrode potential with the acid concentration were shown to depend on deposition of low overvoltage impurities on the surface of the metal. 38 ref. (R5, Mg)

311-R. Cathodic Protection Technical Practices. *Petroleum Engineer*, v. 23, July 1951, p. D9-D12, D14, D16, D18.

Application of cathodic protection and mitigation of electrolytic corrosion caused by stray current from cathodic protection systems. 56 ref. (R10)

312-R. Stove Polish Formulation. *Soap and Sanitary Chemicals*, v. 27, July 1951, p. 79, 81.

Applicability as a corrosion preventative in marine and airplane engines. (R10)

313-R. 18-8 Can Be Cured After Intergranular Attack. R. N. Gillmor. *Iron Age*, v. 168, Aug. 2, 1951, p. 81-85.

Intergranular attack of 18-8 can be cured by holding for long periods of time in the sensitizing temperature range. Cr diffusion from the unaffected areas into the impoverished grain-boundary areas, rather than dissolving the precipitated Cr carbides, apparently causes the cure. Includes photomicrographs. (R2, N1, SS)

314-R. Prediction of Corrosion in Oil and Gas Wells. D. A. Shock and J. D. Sudbury. *Petroleum Engineer*, v. 23, July 15, 1951, p. B86, B88, B90, B92, B94, B96; disc., p. B98.

Using techniques and fundamental data developed by corrosion studies in high-pressure condensate wells, the prediction techniques and evaluation methods were extended to oil-well corrosion. Internal corrosion in both oil and gas wells is believed to be due to acidity developed in the water phase. The acids found and an evaluation of their corrosive behavior; variable factors influencing corrosion rates; utility and limitations of the various prediction schemes. 18 ref. (R11, ST)

315-R. Corrosion-Prevention in a TCC Gas Plant. C. A. Murray and M. A. Furth. *Petroleum Engineer*, v. 23, July 15, 1951, p. C3, C5-C8.

Corrosion-control measures for the gas plant of a modern catalytic-cracking unit. Inspection and laboratory data were used to assess the degree and nature of corrosion. No matter where corrosion occurred, it was found to be almost entirely associated with excessive water present in the system. A corrosion-control program was put into effect that consisted, for the most part, of water-removal measures at key points. (R10, ST)

316-R. Plant Stops Return Line Corrosion—Saves $14,200 a Year. Erle Elliott and Philip J. Gaughan. *Power Engineering*, v. 55, Aug. 1951, p. 104, 106-107, 109.

Results of a method on filming amines to prevent corrosion used at Glen L. Martin Co. (R10, Fe)

317-R. Corrosion of Cars Costs $191 Million a Year—How Can It Be Reduced? *Railway Age*, v. 131, Aug. 6, 1951, p. 65-69.

Typical kinds of corrosion in railway equipment and techniques in design as a means of reducing corrosion damage. (R general, T22, ST)

318-R. Nylon—A Factor in Stress Corrosion of Aluminum Bronze. E. J. Silk. *Journal of Metals*, v. 3, Aug. 1951, p. 600.

Stress-corrosion cracking occurred in a clamp ring of Al bronze in contact with a nylon gear. In view of definite evidence of a stress-corrosion failure and the fact that the Al bronze was metallurgically free of defects, it was concluded that the nylon gear was the contributing factor to the failure. (R1, Cu)

319-R. Fighting Corrosion. Marshall E. Parker. *Industry and Power*, v. 61, July 1951, p. 97-99.

Procedures recommended for protection of pipelines and other buried structures. (R8, R10, Fe)

320-R. Corrosion and Scaling Problems in Piping for Radiant Heating. Richard B. Conlan. *Industry and Power*, v. 61, Aug. 1951, p. 68-69.

Causes of failure and preventive measures. Use of inhibitors is emphasized. (R10, Fe)

321-R. Ocean Test Tube Gets New Extension. *Industry and Power*, v. 61, Aug. 1951, p. 78-79.

Corrosion and fouling test station of International Nickel Co., formerly at Kure Beach, N. C., now rebuilt at Harbor Island, N. C. (R11)

322-R. The Nature and Use of Petroleum Base Rust Preventives. H. B. Carpenter. *Lubrication Engineering*, v. 7, Aug. 1951, p. 174-177.

The four principal types are plastic, fluid, thin-film, and solvent. Various typical uses are discussed. Application and removal. (R26)

323-R. Mercury Boiler Treatment With Titanium and Magnesium Metals. Richard C. Reid. *American Society of Mechanical Engineers,* Paper 51-S-13, 1951, 8 pages.

The action of Ti and Mg metal dissolved in the mercury in protecting boiler steel from attack by Hg. This treatment also produces stable wetting of the boiler surfaces, thus maintaining adequate heat transfer. Phase diagrams of the various metallic systems present, and their behavior at the temperatures encountered. Effects of O_2 with particular attention to air infiltration and its effects on Hg treatment. (R10, M24, Hg, Ti, Mg, ST)

324-R. Report of Committee A-5 on Corrosion of Iron and Steel. T. R. Galloway, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 100-117.

Previously abstracted from *American Society for Testing Materials,* Preprint 3, 1950. See item 256-R, 1950. (R general, S22, Fe, ST)

325-R. Report of Committee B-6 on Die-Cast Metals and Alloys. J. R. Townsend, chairman. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 167-172.

Previously abstracted from *American Society for Testing Materials,* Preprint 12, 1950. See item 257-R, 1950. (R3, Q general Al, Mg, Zn)

326-R. Spray Testing With Natural and Synthetic Sea Water. Part I. Corrosion Characteristics in the Testing Metals. Thomas P. May and Allen L. Alexander. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1131-1141; disc., p. 1142-1143.

A formula is proposed for a solution which duplicates the inorganic components of natural ocean waters. Comparative tests were conducted in spray cabinets using 3% and 20% NaCl, natural ocean water, and the proposed solution. At the same time corrosion tests were conducted in natural environments. These tests reveal little similarity of performance between the natural environments and the spray cabinets using NaCl solution. The only exception exists in the deterioration of Ni-plated steel. In tests with ingot Fe and plain steels, spray tests with natural and synthetic sea waters did not duplicate the types of corrosion usually observed in natural marine environments. ZnO plated steel and solid Zn sheet corrode in a similar manner in synthetic and natural environments. (R11, Fe, CN, Zn, Ni)

327—R. Spray Testing With Natural and Synthetic Sea Water. Part II. A Study of Organic Coatings. Allen L. Alexander and Thomas P. May. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1144-1149; disc., p. 1150.

Previously abstracted from *American Society for Testing Materials.* Preprint 26, 1950. See item 258-R, 1950. (R11, L26, Fe)

328-R. Impact Deposition of Atmospheric Sea Salts on a Test Plate. Alfred H. Woodcock. *American Society for Testing Materials, Proceedings,* v. 50, 1950, p. 1151-1160; disc., p. 1161-1166.

Rusting of structural steels at Block Island, R. I., and at Kure Beach, N. C., has been attributed in major part to the presence of chlorides on the test plates. Indicates the weight and the number of sea-salt nuclei which were deposited on surfaces by impact during the passage of marine winds in the Block Island region. Suggests that impact deposition may largely account for the presence of chlorides on these plates. (R11, CN)

329-R. Effectiveness of Ceramic Coatings in Reducing Corrosion of Five Heat-Resistant Alloys by Lead-Bromide Vapors. Dwight G. Moore and Mary A. Mason. *National Advisory Committee for Aeronautics,* Technical Note 2380, June 1951, 27 pages.

Tests on five heat-resistant alloys. The specimens in an uncoated condition, in a preoxidized condition, and with three different ceramic coatings, were exposed for 6 hr. to $PbBr_2$ vapors in an air atmosphere at temperatures of 1350, 1500, and 1650° F. 10 ref. (R9)

330-R. Advances in Copper and Its Alloys. Part II. John R. Freeman, Jr. *Canadian Metals,* v. 14, July 1951, p. 12, 14.

Engineering alloys, stress-corrosion cracking, and research on quality testing. (R1, S13, Cu)

331-R. Action of Dilute Sulphuric Acid on Magnetized Iron. G. Wagner and F. Blaha. *Nature,* v. 168, July 14, 1951, p. 74.

It has been stated that in addition to H_2, O_2 is evolved in considerable quantities in above reaction whereas with unmagnetized Fe no such phenomenon occurs. Results obtained using spectroscopically pure Fe show that this difference is apparently nonexistent. (R5, Fe)

332-R. Corrosion Tests on Tin-Nickel. S. C. Britton and R. M. Angles. *Metal Industry,* v. 79, July 20, 1951, p. 46-50.

Summarized from a paper presented before the London Centre of the Electrodepositors' Technical Society. Results of a series of tests on an electrodeposited alloy containing 65% Sn and 35% Ni. (R11, Sn)

333-R. Scaling of Gas-Turbine Alloys. A. Preece. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 149-152.

The problem of high-temperature oxidation in the gas turbine, with special reference to the products of combustion of the fuel and impurities which may be present in the fuel. 24 ref. (R2, T25, SG-h, AY)

334-R. Scaling of Heat-Resisting Steels; Influence of Combustible Sulphur and Oil-Fuel Ash Constituents. C. Sykes and H. T. Shirley. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 153-169.

Examines the effect of combustible sulfur and of potentially dangerous ash constituents on the behavior of a range of typical gas-turbine steels under varying air-fuel ratios. Consideration is also given to the effect of molybdenum oxide, in view of the molybdenum content of some of the steels. (R2, T25, SG-h, AY)

335-R. Periodic Phenomena in Vapor Attack on Metals. Application to Determination of Corrosion Rate. (In French.) Rene Dubrisay and Francois Arlet. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 267-270.

Previously abstracted from *Bulletin de la Société Chimique de France.* See item 275-R, 1951. (R9, Ag, Cu)

336-R. A New Instrument for Measuring Electrolytic Corrosion Currents. (In French.) H. P. Godard. *Revue de Métallurgie,* v. 48, Apr. 1951, p. 276-282.

Factors influencing electrolytic corrosion; experiments and measurements with new instrument; and applications (R11)

337-R. Determination by Interference Coloration or by Polarized Light of the Oxidation-Rate of Certain Faces of a Copper Monocrystal. (In French.) Allan T. Gwalthmey and Frederick W. Young. *Revue de Métallurgie,* v. 48, June 1951, p. 434-440.

Presents an experimental method. Results confirm the principle that rate of oxidation depends for the most part on type of crystalline face which makes up the exposed surface. Greatest source of error in the experiments lies in preparation of surface, which must be smooth and not cold worked. 10 ref. (R2, M26, Cu)

338-R. The Potential of the Iron Electrode. (In German.) J. D'Ans and W. Breckheimer. *Naturwissenschaften,* v. 38, 2nd June no., 1951, p. 282.

Experimental results indicate that they influence current concepts of Fe corrosion. (R1, Fe)

339-R. Theory of Oxidation of Metals and Metallic Alloys. (In German.) K. Hauffe. *Werkstoffe und Korrosion,* v. 2, June 1951, p. 221-231; July 1951, p. 243-249.

Formation of thin layers of tarnish on pure metals at lower temperatures, where oxide films cease to become thicker, is explained by electron-energy-level theory. Hole-formation theory explains sealing of metal alloys with ion conducting layers, and scaling systems with excess and deficit electron conducting layers. Effect of phase boundary reactions during oxidation and growth of protective layers, theory of "internal oxidation" of metal alloys, and possibility of developing scale-resistant metallic alloys. 41 ref. (R2)

340-R. The Corrosive Properties of Automobile Transmission Oils. (In German.) A. Bukowiecki. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, June 1951, p. 182-191.

Nine samples of oils with and without Cl were tested for corrosive action on Fe and Cu. Oils heated to 80-120° C. were found to have little effect on Fe even after extended contact, except that chlorinated oil showed distinct "after-rusting" effect on Fe, i.e., Fe removed from oil had an increased tendency to rust when stored in humid atmosphere. All oils strongly attacked Cu at 122° C. 28 ref. (R7, Fe, Cu)

341-R. The Behavior of Copper-Containing Aluminum in Common Salt Solutions. (In German.) Doris Kuhlmann-Wilsdorf and Georg Masing. *Zeitschrift für Metallkunde,* v. 42, Dec. 1950, p. 497-503.

Corrosion tests on Al alloys with 0-6.64% Cu, annealed and quenched from 500° C., in buffered NaCl solutions, show that stationary potential of the alloys increases in nobility with the Cu content of the solid solutions and that Cu, after dissolving with solid solutions, precipitates again. (R5, Cu, Al)

S

INSPECTION AND CONTROL

326-S. Analysis of Aluminum and Aluminum Alloys Using Pin Samples. R. W. Callon and L. P. Charette. *Analytical Chemistry,* v. 23, July 1951, p. 960-966.

A direct-reading spectrochemical method using an ARL research model quantometer with high precision source for the quantitative analysis of Al alloys. Elements of the order of 10% or higher were determined satisfactorily. (S11, Al)

327-S. Radiograph Inspection Adds to Drag Bit Life. J. M. Williams. *Drilling,* v. 12, July 1951, p. 35-36.

Nondestructive inspection of tungsten carbide inserts in drill-bit blades with gamma rays. (S13)

328-S. A Thermocouple System for Molten-Metal Temperature Measurement. L. H. Veiock. *Instruments,* v. 24, July 1951, p. 769-770, 794.

Specifications, techniques, and

construction of apparatus used in measuring the temperature of liquid steel in the open-hearth furnace. (S16, D2, ST)

329-S. Comparison of Methods for Measuring Temperature of Molten Metals. J. W. Percy. *Instruments*, v. 24, July 1951, p. 766-768.

A brief history of various methods. Two types of immersion thermocouples are compared, and so are two types of blow-tube pyrometers. Operation factors. (S16)

330-S. Plate Calibration by Step Filter & Its Use in the Estimation of Manganese, Silicon & Vanadium in High Speed Steels. B. N. Bhaduri. *Journal of Scientific and Industrial Research*, v. 10A, May 1951, p. 101-109.

A rapid plate calibration method based upon the relative intensities of manganese lines 2939 and 2933 and its application to quantitative analysis of high speed steels. The method is sufficiently reliable and the values obtained for alloying elements in steels agree with the values obtained by chemical analysis. (S11, TS, Mn, V, Si)

331-S. Radio-Autographic Determination of Lead in Stainless. L. R. Standifer and Mars G. Fontana. *Metal Progress*, v. 60, July 1951, p. 65-69.

A technique using radioactive tracers in determining the distribution of small amounts of lead in a cast stainless alloy. (S10, S19, Pb, SS)

332-S. Use of Statistical Methods for Comparison of Iron Ores. (In Italian.) Aurelio Palazzi and Roberto Sacedote. *Metallurgia Italiana*, v. 43, May 1951, p. 180-184.

Graphs and charts illustrate methods. (S12, Fe)

333-S. Method of Sampling Steel Shipments for Hardenability Testing. (In Italian.) Aurelio Palazzi. *Metallurgia Italiana*, v. 43, May 1951, p. 185-189.

Treats above mathematically. (S12, J26, ST)

334-S. Procedure Approval Tests. Samuel S. Katsef. *Industry & Welding*, v. 24, Aug. 1951, p. 25-26, 62-64.

Test specifications and inspection procedure used by the Navy for equipment fabricated by welding. "Flowsheet" outlines various phases of test. (S13, K9)

335-S. Weld Inspection in Britain. M. Falk. *Welding Engineer*, v. 36, Aug. 1951, p. 44.

Use of radioactive iridium isotope (tr-192) to inspect welds. (S13, K9)

336-S. The Soft X-Ray Spectroscopy of Solids. E. R. Piore, R. H. Kingston, E. M. Gyorgy, and G. G. Harvey. *Review of Scientific Instruments*, v. 22, July 1951, p. 543.

Reviews work on spectroscopic studies in the region 50-500 Å. Recent development in which photographic recording system was replaced by a Be-Cu photomultiplier. Metals from K through Cu are being investigated by this method. (S11)

337-S. Ultrasonic Inspection Today. H. E. Van Valkenburg. *Tool Engineer*, v. 27, Aug. 1951, p. 36-38.

Present status. (S13)

338-S. Ultrasonic Inspection of Quarry Equipment. John C. Smack. *Pit and Quarry*, v. 44, Aug. 1951, p. 103-104.

Testing apparatus and the method of testing different metal components of crushers, drills, etc. for fatigue cracks. (S13, Q7)

339-S. Some Thermocouple Details for Temperature Measurement. Howard W. Cole, Jr., *Product Engineering*, v. 22, Aug. 1951, p. 166-167.

Diagrams, table, and textual explanation. (S16)

340-S. Report of Committee A-1 on Steel. N. L. Michel, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 81-96.

Previously abstracted from *American Society for Testing Materials*, Preprint 1, 1950. See item 272-S, 1950. (S22, Q general, ST)

341-S. Report of Committee A-9 on Ferro-Alloys. W. C. Bowden, Jr., chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 120-125.

Previously abstracted from *American Society for Testing Materials*, Preprint 5, 1950. See item 273-S, 1950. (S22, Fe-n)

342-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. G. H. Harnden, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 159-166.

Previously abstracted from *American Society for Testing Materials*, Preprint 11, 1950. See item 274-S, 1950. (S22, Cu)

343-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. I. V. Williams, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 173-180.

Previously abstracted from *American Society for Testing Materials*, Preprint 13, 1950. See item 275-S, 1950. (S22, Al, Mg)

344-S. Report of Committee E-3 on Chemical Analysis of Metals. D. R. Evans, chairman. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 433-439.

Previously abstracted from *American Society for Testing Materials*. Preprint 102, 1950. See item 276-S, 1950. (S11)

345-S. Chemical Spectroscopy. Wallace R. Brode. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 513-559.

24th Edgar Marburg Lecture presents comprehensive survey of fundamentals, apparatus, procedures, and applications of spectroscopy in chemical analysis. Treats emission, absorption, infrared, ultraviolet, and visible-region spectroscopy. Spectra of a wide variety of materials, including metals, are illustrated. 61 ref. (S11)

346-S. The Development of a Flaw Detector for Tubes. R. D. Kodis. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 1196-1206; disc., p. 1206.

The a.c. bridge method of magnetic flaw detection was evaluated by application to smooth-bore tubes. Practical difficulties with the method led to investigation of the induction method. By proper combination of detector-head design and a recorder capable of displaying three variables, cracks are shown in picture form for easy evaluation. Use of the induction method for inspecting gun tubes, and for production inspection. (S13, ST)

347-S. Solution Methods of Spectrographic Analysis. *Metallurgia*, v. 44, July 1951, p. 45-49.

Investigations carried out by a panel set up by the British Non-Ferrous Metals Research Assn., on the applicability of above methods. (S11)

348-S. Radioactive Elements in the Study of Steels and Industrial Processes. J. Kohn. *Metal Treatment and Drop Forging*, v. 18, June 1951, p. 239-245; July 1951, p. 289-296.

Reviews recent developments and some investigations recently made in France. Segregation in steel was studied by this method. 38 ref. (S19, ST)

349-S. Inspection of Drop Forgings From a Metallurgical Standpoint. R. J. Brown. *Metal Treatment and Drop Forging*, v. 18, July 1951, p. 312-315.

Various tests which should be made on drop forgings, including superficial examination, chemical tests, and mechanical tests. (S13, Q general, ST)

350-S. Precision Measurement of Rockwell Hardness Diamond Penetrators. F. R. Tolmon and Jill G. Wood. *Engineering*, v. 172, July 20, 1951, p. 89-90.

Measurement of the angle of the conical diamond penetrator on an optically projected image by means of a shadow protractor was found unsatisfactory. A new technique was devised, using an interference microscope. Apparatus and results. (S14)

351-S. Evaluation of Soundness of Cast Iron. *Institute of British Foundrymen*, 1951, 22 pages.

Experimental evaluation of various methods. Includes results obtained by radiography, ultrasonic flaw detection, electrical and magnetic methods, density determination, pressure testing, and other methods. General conclusions and recommendations. (S13, CI)

352-S. Platinum-Platinum Rhodium Thermocouples and Their Industrial Applications. Marcel Chaussain. *Institute of British Foundrymen*, Paper 996, 1951, 17 pages.

Methods for testing wires for above couples, of determining contamination and aging of the wires, and of use for determining temperatures of steel baths. (S16)

353-S. System of Studying Casting Defects. G. W. Nicholls and D. T. Kershaw. *Institute of British Foundrymen*, Paper 1003, 1951, 16 pages.

Record-card and control-chart system. Effects of various factors. (S12, E general)

354-S. Review of Present-Day Steel Foundry Radiographic Practice. G. M. Nichie. *Institute of British Foundrymen*, Paper 1011, 1951, 11 pages.

Includes diagrams, graphs, and illustrations. (S13, E11, CI)

355-S. Suitability of Microradiographic Methods for Metallurgical Problems. (In French.) G. A. Homes and J. Gouzou. *Revue de Métallurgie*, v. 48, Apr. 1951, p. 251-261; disc., p. 261.

Methods are surveyed, particularly the method of "transparence". Applicability to chemical analysis and to detection of various flaws in steel and other metals. (S13, ST)

356-S. Determination of Hydrogen in Liquid Steel by Extraction in a Vacuum at 600°. (In French.) J. Bleton, S. Mischonsniky, G. Coin, and P. Bastien. *Revue de Métallurgie*, v. 48, June 1951, p. 471-485.

Choice of method, liberation of H_2 at 600°, mode of procedure, and value of the method. 25 ref. (S11, ST)

357-S. Measuring High Temperatures. (In French.) Pierre Rodicq. *Fonderie*, v. 64, Apr. 1951, p. 2423-2438.

The Land immersion pyrometer for measuring temperature of fused metals. Compares it with the American Leeds and Northrup pyrometer. Structural details and operation. (S16)

358-S. Statement on the Magnetic Comparator. (In French.) M. Infroit. *Circulaire d'Informations Techniques*, v. 8, No. 3, 1951, p. 299-300.

An electronic device for nondestructive testing of materials. Methods of operation and application are indicated. (S13)

359-S. Effect of Presence of Tin in Lead, and Vice-Versa, on the Spectrochemical Analysis of the Zinc-Lead-Tin System of High Zinc Content. (In French.) Juan Manuel Lopez de Azcona and Luis Jimeno Martin. *Spectrochimica Acta*, v. 4, No. 5, 1951, p. 265-279.

Studied for HNO_3 solutions of Zn with $Pb(NO_3)_2$ and $Sn\,Cl_2 + 2H_2O$ additions, and for electrodes Zn, Pb, Sn. 26 ref. (S11, Zn)

360-S. Comparative Study of Various Excitation Factors in the Quantitative Spectrographic Analysis of Slags. (In French.) J. Gillis and J. Eeckhout. *Spectrochimica Acta*, v. 4, No. 4, 1951, p. 284-301.

Excitation by d.c. arc, Feussner spark-unit, and "multisource" arc and optimum conditions for use. Results of spectrographic methods are compared with those of chemical analysis. It was found that the Feussner unit gives best results. 11 ref. (S11)

361-S. Nondestructive Testing of Materials. (In French and German.) Hch. Zoller. *Pro-Metal*, June 1951, p. 839-844.

X-ray, radioactive, and ultrasonic analysis. (S13)

362-S. The Application of Radioactive Isotopes in Material Testing. (In German.) O. Vaupel and N. von Wetterneck. *Metall*, v. 5, July 1951, p. 293-294.

Shows that γ-rays emitted by synthetic Ir isotopes can be used for X-ray recordings. Experiments were made with different materials, different films, and different instruments. Results reveal that recordings ordinarily fail to show sufficient details, but methods of increasing contrast are discussed. (S19)

363-S. Application of Statistical Methods to Quality Control and Materials Development. (In German.) Ernst Rossow. *Stahl und Eisen*, v. 71, June 21, 1951, p. 649-664.

Principles of statistical methods and computation of operational characteristics (OC curves) for different test plans. Importance of selecting probability of error from technical rather than statistical considerations. Advantages and disadvantages of statistical methods. 47 ref. (S12)

364-S. Spectrographic Analysis of Pure Metals. (In Italian.) D. M. Smith. *Metallurgia Italiana*, v. 43, Mar.-Apr. 1951, p. 121-128.

Analysis of Al, Cu, Pb, Mg, Ag, Au, Pt, and Zn. (S11)

365-S. Methods of Measuring Surface Roughness in the Technology of Surface Finishing. (In Italian.) L. Locati and B. Bianchi. *Metallurgia Italiana*, v. 43, May 1951, p. 176-179. (S15)

T

APPLICATIONS OF METALS IN EQUIPMENT

323-T. Refractory Cermets. L. J. Cronin. *American Ceramic Society Bulletin*, v. 30, July 1951, p. 234-238.

Results of an investigation conducted to determine the suitability of refractory materials for use in special thermionic cathodes in vacuum tubes. Requirements for the cermet materials, produced by mixing, pressing, and sintering of oxides and metal powders. All available substances were tested and satisfactory cermet bodies were developed to meet these requirements. (T1, H general)

324-T. Some Notes on Cast Irons for Diesel Engines. W. G. Ure. *Australasian Engineer*, May 7, 1951, p. 73-77.

Metallurgical aspects of types of iron used in diesel engine manufacture. Main constituents of iron-carbon alloys. Effects of alloying elements. Includes photomicrographs. (T25, CI)

325-T. Forming Problems With Stainless Steel Sheet Metal. *Automotive Industries*, v. 105, July 15, 1951, p. 42-44, 130, 132.

Advantages and limitations to the use of stainless steel in aircraft manufacture. Describes various approaches to problems where half hard stainless sheet must be used. (T24, G general, SS, Al)

326-T. Latest Jet Engines Displayed at Paris Aviation Show. W. F. Bradley. *Automotive Industries*, v. 105, July 15, 1951, p. 45, 106, 108, 112, 114.

General characteristics of various jet engines displayed by various countries at the Paris aviation show. (T25)

327-T. Metal Windows; Large Scale Plant in Scotland. *Iron and Steel*, v. 24, July 1951, p. 331-333.

Operations and materials. Hot rolled mild steel is used; it is Zn plated, and painted. A method for sulphate recovery in the plant is described. (T26, L general, CN, Zn)

328-T. Producing M-47 General Patton Tanks at Baldwin-Lima-Hamilton. *Machine and Tool Blue Book*, v. 47, Aug. 1951, p. 213-214, 216.

Describes and illustrates the above, emphasizing the welding operation. (T2, K general)

329-T. How to Overcome Materials Shortages in Product Design and Manufacture. H. R. Clauser. *Materials & Methods*, v. 34, July 1951, p. 89-112, 112A-112H.

Suggestions on conserving or replacing specific scarce materials in metal fabricating industries. Where and how substitute materials can be used. Includes case histories and reference tables listing specific alternate materials for specific products. (T general)

330-T. Magnesium Alloy Star. *Metal Industry*, v. 79, July 13, 1951, p. 28-29.

A feature at the British festival. The structure was 40 ft. from tip to tip, 6 ft. in depth at the center and weighed 1790 lb. Methods of assembly and welding adopted for various portions of the structure. (T26, K general, Mg)

331-T. Aluminum's Role in Refinery Equipment. E. E. Kerns and W. E. Baker. *Oil and Gas Journal*, v. 50, July 19, 1951, p. 87, 98-99.

Several properties of Al which make it valuable for refinery equipment. 12 ref. (T29, Al)

332-T. The Acid Test for Stainless. *Steel Horizons*, v. 13, no. 3, 1951, p. 8-9.

Stainless steel barrels are a safe, efficient and cheaper container for handling acids and other corrosive materials. (T29, SS)

333-T. Stainless Feed Bag for the Rocket Planes. *Steel Horizons*, v. 13, no. 3, 1951, p. 14-15.

Design and fabrication of a stainless spherical storage tank for N_2 gas. (T26, T24, SS)

334-T. Production of Ozone With Refrigerated Anodes. E. I. Lash, R. D. Hornbeck, G. L. Putman, and E. D. Boelter. *Trend in Engineering at the University of Washington*, v. 3, July 1951, p. 13-16, 32.

By electrolysis of 40 wt. % perchloric acid with refrigerated platinum metal anodes, electrolytic ozone of 58 wt. % concentration has been prepared at energy efficiencies up to 24 g. ozone per kw-hr. The cells used for preparation of H_2-free ozone and a cell with internally cooled PT-Ir anode are described. (T1, PT, Ir)

335-T. Basic Coated Electrodes and Their Characteristics. H. F. Tremlett. *Welding & Metal Fabrication*, v. 19, June 1951, p. 224-228, July 1951, p. 259-264.

Properties of basic coated electrodes, their advantages and disadvantages, their handling characteristics, and metallurgical data. Believes that if basic coated electrodes could become the most generally used type substantial benefits to the welding industry would follow. (T5, K1)

336-T. Light-Metal Cylinders. (In French and German.) A. Von Zeerleder. *Aluminium Suisse*, May 1951, p. 88-92.

Reviews research and discusses the results obtained with a hard chromium plated Al engine cylinder. (T7, Al)

337-T. Powder Metal Gears Offer Economy Plus New Design Opportunities. Carl G. Levin. *Machine Design*, v. 23, Aug. 1951, p. 117-119.

Production data shows that powder-metal gears are economical. New design opportunities are offered. (T7, H general)

338-T. Well Handled for Casting. *Die Castings*, v. 9, Aug. 1951, p. 19, 62.

Application of Al die castings for bait-casting rod handles. (T10, Al)

339-T. 4 in 1. *Die Castings*, v. 9, Aug. 1951, p. 20-22.

Models of slide projectors made from one basic Al die casting. (T9, Al)

340-T. Close Tolerance on Concentricity. *Die Castings*, v. 9, Aug. 1951, p. 24-25, 61.

Use of Zn die castings for windshield-wiper motors. (T1, Zn)

341-T. Low Cost Power Transmission Elements. R. H. Schoening. *Die Castings*, v. 9, Aug. 1951, p. 27-28.

Use of Zn-alloy die castings. (T1, Zn)

342-T. Built for Durability. *Die Castings*, v. 9, Aug. 1951, p. 30-32.

Latches for walk-in refrigerators, constructed of die cast Zn, brass forgings, brass extrusions, and cold rolled steel. (T6, Zn, Cu, ST)

343-T. Helical Inserts Protect Threads in Die Casting. *Die Castings*, v. 9, Aug. 1951, p. 42-44, 62-63.

Use of stainless steel helical-wire thread in Al, Mg, and Zn die cast components for resistance to heavier loads, wear, corrosion, and vibration. (T7, SS)

344-T. Aluminum Masts for Radar. *Welding Engineer*, v. 36, Aug. 1951, p. 17.

High antennas to give a larger radius of radar detection are one of today's needs. The Navy is offsetting the greater weight by substituting Al for steel. (T1, Al)

345-T. High-Velocity Burners Cut Fuel Costs and Furnace Size. L. C. Peskin. *Iron Age*, v. 168, Aug. 9, 1951, p. 63-66; Aug. 16, 1951, p. 104-107.

A ram-jet burner which has reduced heating equipment volume as much as 75%, completely vaporizing and burning gas or liquid fuels. A non-luminous flame produces clean, soot-free convection heat—or heat plus special atmospheres. Burner may be used in connection with reheating, continuous annealing, heat treating, ore beneficiation, and refining. Part II describes application of convection heating and the high-velocity burner to steelmaking and heat treatment. A drawing of a prototype continuous-strip annealing furnace is included. (T5)

346-T. Materials for Fastenings in Electrical Applications. Melvin N. Veeder. *Electrical Manufacturing*, v. 48, Aug. 1951, p. 120-121, 240, 242, 244.

Considerations in selecting the most suitable material. Applicable properties of various ferrous and nonferrous materials for this use. (T7, T1)

347-T. Bridging the Gap Between Iron and Steel. *Production Engineering & Management*, v. 28, Aug. 1951, p. 57-61.

Meehanite metal with high "as-cast" tensile strength, good machin-

ability, adaptability to heat treatment, uniformity, and high freedom from defects is considered for some hard-to-get parts.
(T general, Q general, CI)

348-T. Association of Iron and Steel Engineers, Plain Bearing Recommended Practice. AISE Recommended Practice No. 1, April 29, 1951, (Tentative). C. E. Pritchard, chairman. *Iron and Steel Engineer,* v. 28, July 1951, p. PB1-PB37.

Correlates available data covering the fundamental requirements of good bearing practice, and all its many ramifications. Deals with design, operation, and maintenance of properly lubricated journal bearings. 23 ref. (T7, SG-c)

349-T. The Team Behind the Plow. George Laycock. *Steelways,* v. 7, July 1951, p. 8-11.

Miscellaneous applications of steel in farm equipment. (T3, ST)

350-T. Miracle in the Stock Yards. Robert West Howard. *Steelways,* v. 7, July 1951, p. 12-14.

Applications of stainless steel in equipment used to process by-products of the meat-packing industry. (T29, SS)

351-T. Steel Goes to Dinner. Ronald M. Deutsch. *Steelways,* v. 7, July 1951, p. 18-19.

Manufacture of stainless steel tableware. (T10, SS)

352-T. The Manufacture, Testing and Inspection of Turbine and Turbo-Alternator Rotors for Power Stations. H. H. Burton. *Metallurgia,* v. 44, July 1951, p. 22-28.

Various operations, from choice of steel, through ingot production, forging, and heat treatment to final inspection. Refers to some of the difficulties encountered. (T25, ST)

353-T. Materials and Performance. A. T. Bowden and W. Hryniszak. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 11-17.

The effect of using high-alloy steels upon the construction of the combustion chamber and heat-exchanger in the gas turbine in terms of high temperatures and high stresses, corrosion, erosion, scaling, etc. partly from experience gained with the Parsons experimental gas turbine. The influence of the material on the construction of the compressor. The choice of material is governed by the gas temperature, which is dependent on the required turbine inlet temperature.
(T25, Q general, SG-h, AY)

354-T. Gas-Turbine Performance and Materials. J. B. Bucher. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 17-23.

Some of the more urgent metallurgical problems for which the industrial gas-turbine designer awaits solutions. Information on creep resistance, weldability, and corrosion by vanadium pentoxide is given. Need for further research is stressed.
(T25, Q3, K9, R9, SG-h)

355-T. Some Proven Gas-Turbine Steels and Related Developments. D. A. Oliver and G. T. Harris. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 46-59.

Developments in special steels for jet engines. New long-time creep data for the austenitic steels up to 30,000 hr. Some considerations governing the choice and use of ferritic steels. Discusses steels for cast turbine casings and relaxation-resisting bolts. Influence of gas atmosphere composition on the oxidation and scaling of different steels. 21 ref.
(T25, Q general, SG-h, AY, SS)

356-T. Development of a High-Temperature Alloy for Gas-Turbine Rotor Blades. G. T. Harris and H. C. Child. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 67-80.

The general effect of the carbide-forming elements W, Mo, Cb, V, and Ti, the carbon content, and the composition of the base, on the creep strength at 750 to 800° C. of austenitic Ni-Co-Fe-Cr alloys, was investigated. An alloy suitable for gas-turbine rotor blades is Jessop G32, a Co-base alloy. The optimum heat treatment for this alloy. The nature of the phases which precipitation-harden some of the alloys was investigated by the carbide-extraction technique. (T25, Co, SG-h)

357-T. Chromium-Base Alloys for Gas-Turbine Applications. E. A. G. Liddiard and A. H. Sully. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 243-245.

Methods of producing Cr-base alloys. Difficulties encountered in all methods designed to remove O_2 from the metal and to prevent further contamination by O_2, N_2, or C. Creep properties, ductility, and other properties affecting their application.
(T25, Cr)

358-T. Sweat-Cooling: A Review of Present Knowledge and Its Application to the Gas Turbine. P. Grootenhuis and N. P. W. Moore. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 281-288.

General mechanism. It is suggested that the properties necessary for a sweat-cooled component can best be provided by powder-metallurgy methods. Porosity vs. permeability and porosity vs. mechanical strength. Published data on properties of porous metallic compacts are reviewed. 47 ref.
(T25, H general, SS, AY)

359-T. Future Needs in Materials for Land and Marine Gas Turbines. J. M. Robertson. *Iron and Steel Institute.* "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 293-303.

The factors that are important in relation to the performance of materials in gas-turbine components that operate at high temperatures; the making, shaping, and treating of these components; and their cost. Classes of material now being used, and likely to be used in the near future, in the production of gas-turbine components. (T25, SG-h)

360-T. Aluminum Bronze Valve Casings. (In French.) *Fonderie,* v. 64, Apr. 1951, p. 2447-2449.

Manufacture of above. (T7, Cu)

361-T. The Service of Metals in the Petroleum Industry. (In French.) B. Hedde d'Entremont. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 271, 273, 275-276.

Various aspects, in particular the prevention of metal corrosion occurring in parts used in contact with petroleum fuels.
(T28, T29, R7, ST)

362-T. The Use of Aluminum in the Construction of Swiss Railroad Cars With Pneumatically Tired Wheels. (In German and French.) R. Guignard. *Aluminium Suisse,* May 1951, p. 93-97; July 1951, p. 136-143.

Proposed light-metal designs; static stress tests. (T23, Al)

363-T. Aluminum in Metal Structures. (In French and German.) W. C. Devereux. *Aluminium Suisse,* July 1951, p. 144-153.

Experiences with aluminum buildings in different countries. Results of strength tests with a variety of structural Al profiles insure longer life and greater safety for Al structures. (T26, Q23, Al)

364-T. Materials of Construction for the Chemical Industry (Survey). Part I. Iron and Steel. Part II. Nonferrous Metals. (In German.) E. Franke. *Werkstoffe und Korrosion,* v. 2, May 1951, p. 173-181; July 1951, p. 249-258.

Surveys corrosion of stainless steels, austenitic Mg steels, Fe alloys with a high content of Si, heat resisting low-alloy steels, carbon steels, and cast iron, as well as their possibilities for use in the chemical industry. Part II discusses Cu, Al, Ni, Ti, Zr, Ta, and the noble metals. Reviews the literature. 255 ref.
(T29, R general, Fe, Cu, Al, Ni, Ti, Zr, Ta).

365-T. Hot-Dip Zinc-Plating Tank of Pure Iron. (In German.) A. Kalpers. *Metall,* v. 5, July 1951, p. 290-291.

Under properly maintained conditions, above tank offers excellent service. The material contains only 0.15% of the usual impurities.
(T5, L17, Fe, Zn)

366-T. Nickel Anodes. (In German.) Edm. R. Thews. *Metalloberfläche,* sec. B, v. 3, July 1951, p. B101-B107.

Use of cast, forged, rolled, sintered, and electrolytically produced anodes. Production methods for cast and rolled nickel anodes.
(T5, E11, F23, Ni)

V

MATERIALS
General Coverage of Specific Materials

98-V. Characteristics and Technology of Some Aluminum-Base Bearing Alloys. (In Italian.) *Alluminio,* v. 20, 1951, p. 173-185.

Presents comprehensive summary of available information on compositions, microstructures, physical and mechanical properties of the above alloys. Tables, graphs, and photomicrographs. 19 ref. (Al, SG-c)

99-V. How to Ensure Effective Use of Materials. J. R. Widdowson. *Machinery* (London), v. 79, July 12, 1951, p. 79-81.

An abstract of a paper presented at the Harrogate conference of the Institution of Product Engineers. Alternative steels to replace the scarce, more highly alloyed types. Considers conservation of H_2SO_4 and fuel. (AY, ST)

100-V. Ductile Iron Saves Strategic Materials for Defense Program. *Inco,* v. 24, no. 4, p. 12-13.

Brief survey of the applications of ductile iron and its advantages over steel forgings. (CI)

101-V. Molybdenum: A New High-Temperature Metal. Robert M. Parke. *Metal Progress,* v. 60, July 1951, p. 81-96.

A new role for Mo—its use as a structural material resistant to the damaging effects of temperature. Various physical and mechanical properties related to its new uses. 81 ref. (Mo)

102-V. Zirconium. Stephen M. Shelton. *Scientific American,* v. 184, June 1951, p. 19-21.

A general review of developments in use and technology. (Zr)

103-V. What Do You Know About Stainless? Howard E. Boyer. *Steel Processing,* v. 37, June 1951, p. 287-292; July 1951, p. 345-349.

The various types of stainless steel, their compositions, properties, and microstructures. (SS)

104-V. Metals for the West. R. G. Paul. *Western Machinery and Steel World,* v. 42, July 1951, p. 93-95.

Operations in Al manufacture at the Vernon Works, Los Angeles. Includes ingot production, foundry melting and alloying, extrusion, heat treatment, forging, etc. (Al)

105-V. Processing Titanium. Frank Charity. *Modern Machine Shop*, v. 24, Aug. 1951, p. 168-170, 172, 174, 176, 178.

Experimental work at North American Aviation on primary and secondary working, heat treatment, and joining of Ti. Results point way to wider application. (Ti)

106-V. Nickel. John V. Beall. *Mining Engineering*, v. 3, Aug. 1951, p. 664-673.

Economic aspects of this strategic metal. Statistics on consumption, properties, and uses of alloyed and unalloyed nickel commodities. Reserves and production methods. (Ni)

107-V. Properties and Uses of Aluminium and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering*, v. 17, Aug. 1951, p. 261-264.

Review and production statistics. (Al)

108-V. Probing Into the Unusual Metals. Clyde Williams. *Monthly Business Review*, v. 33, Aug. 1951, p. 12.

Reviews the research and production situation for unusual metals such as Zr, Ge, Mo, U, Ti, and V. Properties affecting applications of these metals.
(EG-b, Zr, Ge, Mo, U, Ti, V)

109-V. Boron Steels: A New Era in Alloy Metallurgy. D. I. Brown. *Iron Age*, v. 168, July 5, 1951, p. 79-85; July 12, 1951, p. 85-90; July 19, 1951, p. 102-106; July 26, 1951, p. 68-72; Aug. 9, 1951, p. 75-79; disc., p. 79-80.

The background of boron steels; recommended alternates for standard grades; and advantages and limitations of the new steels. Compositions and effects on hardenability and isothermal-transformation temperatures. Part III: results of fatigue, tensile, and wear tests. Part IV: tests on parts made from the new steels. Part V: some boron steels which have been adopted for cold-headed bolt applications to replace the 4037 grade. Types used for shafts. (AY)

110-V. Magnesium-Cerium Wrought Alloys for Elevated-Temperature Service. K. Grube, J. A. Davis, and L. W. Eastwood. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 965-987; disc., p. 988.

Previously abstracted from *American Society for Testing Materials*. Preprint 30, 1950. See item 143-V, 1950. (Mg, SG-h)

111-V. Aluminum—6 Per Cent Magnesium Alloys for Elevated-Temperature Service. L. W. Eastwood, Webster Hodge, and C. H. Lorig. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 1013-1033; disc., p. 1034.

Composition, physical and mechanical properties, corrosion resistance, and machinability of an alloy of above type developed as a result of a systematic study Al-base alloys containing Mg. (Al)

112-V. Chromium-Base Alloys. W. L. Hevekotte, C. T. Greenridge, and H. C. Cross. *American Society for Testing Materials, Proceedings*, v. 50, 1950, p. 1101-1126; disc., p. 1127-1130.

A condensed version of the final report which summarized results of research conducted at Battelle Institute from Oct. 1945, to Mar. 1950, on Cr-base alloys, particularly the 60-15-25 Cr-Fe-Mo type, for Office of Naval Research. Main topics are the melting and casting apparatus; preparation of test materials; microstructures; mechanical properties; and high-temperature oxidation resistance. Mechanism of microcrack formation and role of plastic deformation. (Cr)

113-V. Stainless Steel. B. H. DeLong. "ABC of Iron and Steel, Ed. 6," Penton Publishing Co. (Cleveland), 1950, p. 340-357.

Survey giving historical, operational, and production data. Properties of stainless steels. (SS)

114-V. Bibliography on Titanium Metal and Alloys (1946-1950) (Properties, Fabrication, Uses). J. W. Meier. *Canada Dept. of Mines and Technical Surveys*, Information Memorandum 303, Dec. 20, 1950. 17 pages.

211 references. (Ti)

115-V. Production and Properties of Aluminium Casting Alloys. F. H. Smith. *Institute of British Foundrymen*, Paper 1006, 1951, 19 pages.

Equipment and procedures, with emphasis on recovery of secondary Al. Compositions, trade names, miscellaneous properties, and production and consumption data. (A8, Al)

116-V. A Survey of the Development of Creep-Resisting Alloys. N. P. Allen. *Iron and Steel Institute*. "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 1-10.

Trend of researches undertaken after 1939 in Great Britain, America, and Germany to provide improved materials for use in gas turbines. The properties of alloys that were relied upon in each country are described in terms of stresses giving plastic deformations of 0.1% in 1000 hr. 17 ref. (Q3, AY, SG-h)

117-V. Nickel-Chromium-Titanium Alloys of the Nimonic 80 Type. L. B. Pfeil, N. P. Allen, and C. G. Conway. *Iron and Steel Institute*. "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 37-45.

Use in gas-turbine service. Research methods used to determine the solid solubility of selected addition agents, the response of the alloys to heat treatment, their forgeability, and their high-temperature properties. The composition and structure of Nimonic 80 and 80A in relation to their high-temperature mechanical properties and creep resistance. 24 ref. (Ni, SG-h)

118-V. Research and Development on High-Temperature Materials. C. A. Bristow and H. Sutton. *Iron and Steel Institute*. "Symposium on High Temperature Steels and Alloys for Gas Turbines," 1951, p. 289-292.

The importance of availability in deciding on the constituent elements for high-temperature alloys. Metallurgical factors affecting the choice of metallic materials illustrated by various types of alloy. Examples of long-range fundamental research on such work. 15 ref. (SG-h)

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Sept. 17	Engineers' Club	Ward R. Myers	Selection of and Service Performance of Engineering Materials in Chemical and Metallurgical Industry
	Oct. 9	Engineers' Club	John C. Smack	Ultrasonic Materials Tester
Birmingham	Oct. 3	Hooper's Cafe	R. E. Cramer	Research on the Shelly Rail and Other Rail Problems
Boston	Sept. 22	North Shore Country Club		Annual Outing
Buffalo	Oct. 11	Ford Motor Co. Stamping Plant		Plant Visit
Canton-Massillon	Oct. 2	Mergus Restaurant	N. C. Jessen	Welding of Stainless Steels
Chicago	Oct. 8	Furniture Mart	A. J. Pepin	New Developments in the Forging of Light Metals
Cincinnati	Oct. 11	Engineering Society	J. O. Almen	Residual Stress and Fatigue of Metals
Cleveland	Oct. 8	Cadillac Tank Plant	Chester F. Robards	Plant Visit
Columbus	Oct. 3	Broad St. Church of Christ	Fred Kroft	Alloys for Special Purposes
Dayton	Oct. 10	Engineers' Club	Claus G. Goetzel	Recent Developments in the Field of Powder Metallurgy
Detroit	Oct. 8	Rackham Bldg.	F. P. Zimmerli	Metallurgy in the Mechanical Spring Industry (Woodside Memorial Lecture)
Ft. Wayne	Oct. 8	Howard Johnson's	Lowell B. Moon	Strategic Materials
Hartford	Oct. 9	The Hedges	Porter R. Wray	Boron Steels
Indianapolis	Sept. 17	McCarney's Restaurant	Murray C. Udy	Boron in Steels
	Oct. 15	Western Electric Co.		Plant Visit
Los Angeles	Sept. 24	Roger Young Auditorium	Walter Mathesius	The Rise of Western Steel
	Oct. 26	Roger Young Auditorium		
Louisville	Oct. 10	Speed School	T. S. Fuller	Problems in Material Selection
Manitoba	Oct. 11			
Milwaukee	Sept. 18	Wisconsin Hotel	Porter R. Wray	The Role of Boron Steels in the Present Emergency
New Haven	Oct. 18	Bridgeport	Clayton Baer	Principles of Machining
New Jersey	Sept. 17	Essex House	W. E. Jominy	Wear (Joint Meeting with New York)
	Oct. 15	Essex House	Panel of Speakers	Scrap
New York	Sept. 17	Essex House	W. E. Jominy	Wear (Joint Meeting with New Jersey)
	Oct. 11	Latin Quarter		Smoker
Notre Dame	Oct. 10	Engineering Bldg.	E. A. Hoffman	Machinability
Oak Ridge	Sept. 26		Panel of Speakers	Availability, Substitution and Fabrication of Critical Materials
Ontario	Oct. 5	Hamilton	H. Thomasson	Application of Metallurgical Principles to Product Design
Ottawa Valley	Oct. 2	Physical Metallurgy Research Laboratories	Robert H. Aborn	Martensite and Marquenching
Penn State	Oct. 9			Social Meeting
Philadelphia	Sept. 28	Temple University	A. J. Berdis	The Fairless Works of U. S. Steel
	Oct. 26	Engineers' Club	Bruce Gonser	The Unusual Metals
Pittsburgh	Oct. 11	Roosevelt Hotel	Frank L. Toy	Process Metallurgy of Iron and Steel Making
Rhode Island	Oct. 3	Revere Copper and Brass Inc.	James Hinman	Recent Developments in Copper and Brass (Plant Visit
Rochester	Sept. 22	Point Pleasant Hotel		Clambake
Rocky Mountain	Sept. 28	Colorado Springs	W. E. Jominy	Wear (National Officers Night
Pueblo Group	Oct. 18	Pueblo	R. B. Mears	Chemistry of Corrosion
Saginaw Valley	Oct. 9	Frankenmuth, Mich.	F. Keller	Metallography of Light Metals
Texas	Oct. 2		A. G. Forrest	Tentative Standard Specifications of Alloy Steels and Their Hardenability
Toledo	Oct. 11	Maumee River Yacht Club	W. T. Groves	New Low-Alloy Steels
Utah	Sept. 27		Robert G. Strother	Nondestructive Testing
	Oct. 25	Salt Lake City	Charles Locke	Foundry Technology and Metallurgy
Washington	Sept. 21	Dept. of Commerce Audit.	John Chipman	Chemistry of Liquid Steel
West Michigan	Sept. 17	Morton House, Grand Rapids	H. K. Yeager	New Alloy Steels for Use During the Emergency
	Oct. 15	Morton House	E. J. Pavesic	New Heat Treating Equipment and Applications
Western Ontario	Oct. 7	Cobble Stone Inn		
Wichita	Sept. 18	Knights of Columbus Hall		
	Oct. 16	Knights of Columbus Hall		
Worcester	Oct. 10	Uxbridge Worsted Co.		Plant Visit

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

JUNIOR WELDING ENGINEER: Excellent opening for recent graduate welding or metallurgical engineer with some practical experience in welding. Position involves welding development, procedures and quality control. Large eastern fabricator of carbon steel and alloy materials. Please furnish details of experience, education, age and salary expected. Box 9-5.

SHOP EXECUTIVE: For large heat treating plant in the East with great variety of work. Mature man with broad background of experience and sound metallurgical training. Capable of planning work, supervising operations, maintaining rigid quality standards and getting maximum output. Requires initiative, energy, resourcefulness. Outstanding opportunity for man who can prove ability. State qualifications fully and starting salary expected. Box 9-10.

JUNIOR METALLURGIST: Recent graduate preferred. Good opportunity in well-equipped laboratory. Development, troubleshooting, control on cold rolled steel strip, metal fabrication, heat treatment, applications of tool steels, some nonferrous work. Give resume and salary desired in first letter. Box 9-20.

PHYSICAL METALLURGIST: Research position with opportunity open for recent graduate with knowledge of powder metallurgy. Employment in central Massachusetts. Give complete details of education and experience. Box 9-25.

METALLURGIST: For Industrial Test Laboratory, Philadelphia Naval Shipyard. Classification GS-7, $3825 per year. Requires B.S. degree in metallurgy with six months experience, or M.S. degree. Must be able to conduct X-ray, gamma ray, magnaflux, and Zyglo examinations of castings, weldments, and forgings to determine their suitability for naval use. Box 9-30.

METALLURGIST or ELECTROCHEMIST: Naval Air Material Center, Naval Base, Philadelphia, needs a metallurgist or electrochemist. Salary $6400 per year. Duties, in general, are to supervise a small development group engaged in work on electrodeposited metallic coatings, corrosion studies as applied to aircraft alloys and components, and surface treatments for the promotion of improved paint adhesion. Supervision of engineering personnel is prerequisite background experience. Write: Industrial Relations Department, Naval Air Material Center, Naval Base, Philadelphia 12, for an application for employment.

MAGNAFLUX INSPECTION UNIT
with approximately 3000 Amp. DC output 220-V 60-C by the wet continuous method, complete with demagnetizer and accessories, is needed. Write American Ball Bearing Company, 70 Flushing Ave., Brooklyn, New York.

FOR SALE

We own and offer for immediate delivery:

One—Hardening Furnace, High Speed, Type HGF-101, C.I. Hayes & Company, Hearth Dimensions: 28" L. x 14" W. x 5½" H., atmosphere controlled, rated 40 K.W., 220 V., 3 phase, 60 cycle. G.E. Gas Converter 200 CFH Brown Instrument 100°-3000° F.

One—Hardening Furnace, Atmosphere, Lindberg Electrically controlled rotary, rated 55 K.W., 220 V., single phase, 60 cycle. New hearth necessary, otherwise in excellent condition.

Inspection invited:

Pearson Industrial Steel Treating Co.
5757 Ogden Ave., Cicero 50, Ill.
Phone: BIshop 2-1757

Midwest

SENIOR METALLURGIST: For research and development in metal processing, melting, fabrication, and joining of special metals and alloys. Advanced degree in metallurgy plus 5 to 10 years experience required. Location in Pittsburgh area. Box 9-35.

GRADUATE METALLURGISTS: For development and production work in company located in Pittsburgh district producing carbon, alloy and stainless steel wire and wire products. Some experience in ferrous metallurgy preferred. Give complete details regarding education, experience, references, salary desired and photograph, if possible. Box 9-15.

South

METALLURGIST or CHEMICAL ENGINEER: For research in physical metallurgy and/or teaching physical metallurgy, 11 months annually, in Southern university. Box 9-40.

MATERIALS ENGINEER: Graduate in metallurgy or chemical engineering with practical industrial experience in heat treating and standardization of ferrous and nonferrous metals. Some mechanical engineering experience desirable. Box 9-45.

METALLURGIST-CHEMIST: Georgia location. Experienced man required. Large national fabricators of heavy equipment. Operations include welding, melting, pouring and heat treating of ferrous and nonferrous metals. Physical and chemical laboratory fully equipped. Mail picture and full qualifications with first letter. Good opportunity with progressive organization. Box 9-50.

West

METALLOGRAPHER: Aluminum manufacturer in Pacific Northwest desires recent graduate in physical metallurgy for training in research laboratory. Good opportunity to learn the fundamentals of the metallurgy of aluminum alloys. Reply giving age, education, experience and salary desired. Include photograph. Box 9-55.

POSITIONS WANTED

FORMING SPECIALIST: M.S. degree. Twelve years of broad fundamental background and experience, primarily while supervising and directing basic research and production development. Numerous technical papers. All major metals. Desires industrial position which will challenge his entire background. Can be reached at National Metal Congress, Oct. 13-19, by daytime message through WOodward 5-1617. Box 9-60.

METALLURGIST: Age 27. M.S. degree. Married, one child. Employed in ferrous research. Served two year assistantship in physical metallurgy and metallography. One year in steel mill. Training in statistical quality control. Interested in research or development position. Will locate in East or Midwest, but prefer New York City area. Box 9-65.

ENGINEER

A Philadelphia manufacturing concern has a position available for an engineering graduate with a minimum of 5 yrs. experience in heat treatment of metals; design and operation of heat treating furnaces. Position involves applying industrial instruments to heat treating operations. Applicants should have an interest in instrumentation and electronics.

Reply stating education, experience and personal data to
Address P-77 P.O. Box 3414
Philadelphia 22, Pa.

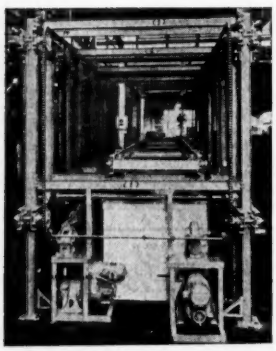
DEVELOPMENT ENGINEER: Age 25. Single. B.S. degree. Three years experience in steel mill on development surveys, investigations, metallurgical smoke control. Also some experience as combustion instructor. Best references. Prefer Pittsburgh area. Box 9-70.

CORROSION ENGINEER: Age 26. Married. Three years college and five years practical background in rustproofing industry. Present position entails supervision of accelerated test laboratory, customer sample analysis and paint laboratories, and government specification testing. Desire position more closely related to corrosion from a metallurgical standpoint. Box 9-75.

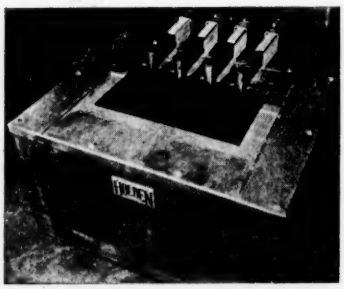
METALLURGICAL ENGINEER: Nine years successful experience in industrial and academic research and development. Excellent scientific background in physical and process metallurgy, including program planning. Specialized knowledge of all types of metal working and heat treating, including vacuum melting, X-ray diffraction, metallography and testing. Qualified for position of top responsibility. Age 30, married. Prefer Eastern location. Box 9-80.

HOLDEN POT FURNACES AND CONVEYORS

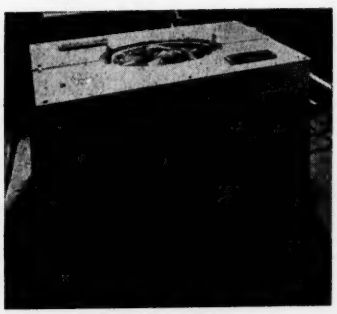
APPLICATIONS – Hardening . . . Annealing . . . Descaling . . .
Martempering . . . Austempering . . . Isothermal Annealing
and Descaling . . . Stainless Steel Descaling (Sodium Hydride) . . .
Sand Removal . . . Bluing . . . Blacking . . . Carburizing



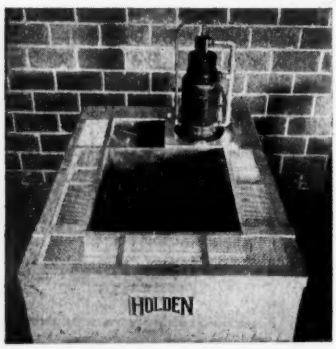
HOLDEN Electrode Furnace with Automatic Conveyor



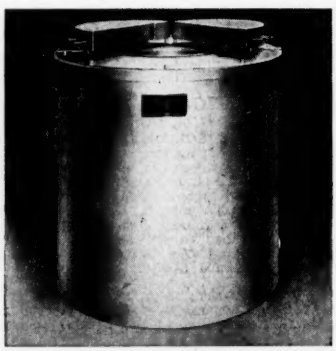
HOLDEN Electrode Furnace



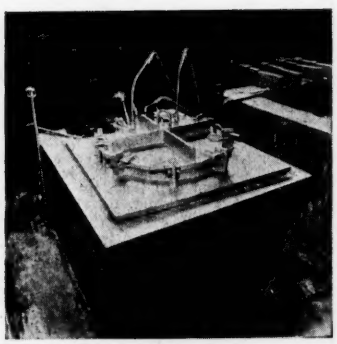
HOLDEN Gas-Fired Furnace



HOLDEN Marquenching or Austempering Furnace— Gas or Electric



HOLDEN Electric Resistance Furnace



HOLDEN Liquid Nitriding Furnace

THE A. F. HOLDEN COMPANY

P. O. Box 1898
New Haven 8, Conn.

11300 Schaefer Highway
Detroit 27, Michigan